

**WINDBREAK SUITABILITY GROUPS
FOR NEVADA**



**SOIL CONSERVATION SERVICE
NEVADA DIVISION OF FORESTRY**

WINDBREAK SUITABILITY GROUPS

Introduction

Each tree or shrub has certain climatic and physiographic limits. Within these parameters, a tree may be well or poorly suited because of soil characteristics. Windbreak Suitability Groups (WISG's) have been developed by considering individual species performance under specific conditions of soil, climate, physiography and management.

WISG's are a guide for selecting species best suited to different kinds of soils and for predicting height growth and long-term effectiveness. The groups are used primarily to select plants for windbreaks. They are also useful in determining species and performance for recreation, wildlife, ornamental or environmental plantings.

WISG's Defined

Each WISG has three subdivisions: 1) A geographic extent described by one or more full or partial Major Land Resource Areas (MLRA's; refer to standard MLRA maps for the state available from the SCS), 2) A group of soils with similar properties and characteristics that limit species adaptation and growth, and 3) effective moisture subgroups (EMSG's) defined by natural average annual precipitation (refer to standard annual precipitation maps for the state), aspect and presence/absence of a moisture run-in topographic position. For example, a WISG in southern Nevada may be described by MLRA(s), soil group and EMSG as:

D30, 1K-WET FAVORABLE CARBONATES, EMSG=C

To clarify, D30 (the Sonoran Basin and Range area of Nevada) defines the geographic extent, 1K-WET FAVORABLE CARBONATES equates to loamy soils with carbonates having an optimum moisture situation for plant growth, and EMSG=C refers to an average annual precipitation of 7-9 inches that, because of a run-in position, behaves like a 10-12 inch precipitation site.

WISG Interpretations and Limitations

Each WISG in part II consists of a specific moisture supplying capacity (natural or artificial) for a specified range of soil properties/characteristics within a designated geographic area. The values for 10 and 20 year heights are estimates of the average heights that the adapted species can be expected to reach under conditions of competent management (dashes in a column for a species indicates the plant is not adapted or that the EMSG does not occur in the listed geographic area). Conditions of

competent management are defined as no damage from livestock, equipment or pesticides; little or no competition from grass and weeds; and, if irrigated, deep watering at a frequency commensurate with the needs of the particular species.

Obviously, the specified heights are not possible under poor management conditions. In addition, a certain amount of variation can be anticipated for individual soils that fall within a WISG soil group. Likewise, the actual moisture reaching a site (within the range of an EMSG) can vary the performance of tree and shrub species. The WISG interpretations are intended to help a conservationist, forester or landowner produce a reliable list of adapted trees and shrubs and their 10 and 20-year heights for purposes of achieving a functional windbreak or other row-type planting.

Classifying a Site's WISG

To determine the proper WISG for a particular site, refer to the Guides that follow (pages I-3 through I-6). After you have determined the site's geographic area, soil group and effective moisture subgroup, use the index on page I-7 to find the appropriate list of species and interpretations (by page number) for the particular geographic area's tables in part II. Each WISG in part II consists of a soil group description and 10 and 20 year heights of adapted species for different EMSG's. As an alternative, part III correlates individual soils and WISG's and can directly specify the correct WISG (and page number) in part II. The procedure for accessing a WISG using part I tables is:

Subdivision:	Example:	Your Site:
Geographic area (page I-3)	D30	_____
Soil group (pages I-4 & I-5)	1K - WET, FAVORABLE, CARBONATES	_____
EMSG (page I-6)	C	_____
Turn to:		
WISG Index (page I-7)	D30, 1K, EMSG=C (turn to appropriate geographic area's packet and page in part II)	_____

WISG Assistance

Technical assistance on classifying a site's WISG can be requested from the Soils or Ecological Sciences staffs at the Reno State Office of the Soil Conservation Service.

GUIDE to WISG Geographic Areas

WISG geographic subdivisions consist of three areas in Nevada; they are described below. Subdivisions are based on groupings of MLRA's (refer to the standard map for the state). Each area has precipitation distributions and temperatures having enough similarities to adequately delimit a list of adapted trees and shrubs. (Note: Each WISG geographic subdivision is used to create a series of Soil Group/EMSB tables in part II. A particular location may have only the series of tables needed for their area of concern. The WISG MLRA's are identified at the top of each table in part II.)

* * *

MLRA(s): D23, D24, D25, D28A, D28B

Counties: *Churchill (part), Elko, Eureka, Humboldt, Lander, Lincoln (part), Nye (part), Pershing (part), Washoe (part), White Pine.*

* * *

MLRA(s): D26, D27, D29

Counties: *Churchill (part), Douglas, Esmeralda, Lincoln (part), Lyon, Mineral, Nye (part), Ormsby, Pershing (part), Storey, Washoe (part).*

* * *

MLRA(s): D30

Counties: *Clark, Esmeralda (part), Lincoln (part), Nye (part).*

GUIDE to WISG Effective Moisture Subgroups (EMSG's)

EMSG's consist of 8 natural moisture categories or subgroups and one artificial subgroup. They are denoted by the capital letters A through I. A full description of each follows. Refer to standard annual precipitation maps developed for the state.

EMSG A - Sites receiving an average annual precipitation (AAP) of less than 7"; or 7 to 9" AAP on south/southwest aspect slopes greater than 15% gradient.

EMSG B - Sites receiving an AAP of 7 to 9"; or an AAP of less than 7" in a water run-in position or on north/northeast aspect slopes greater than 15% gradient; or an AAP of 10 to 12" on south/southwest aspect slopes greater than 15% gradient.

EMSG C - Sites receiving an AAP of 10 to 12"; or an AAP of 7 to 9" in a water run-in position or on north/northeast aspect slopes greater than 15% gradient; or an AAP of 13 to 15" on south/southwest aspect slopes greater than 15% gradient.

EMSG D - Sites receiving an AAP of 13 to 15"; or an AAP of 10 to 12" in a water run-in position or on north/northeast aspect slopes greater than 15% gradient; or an AAP of 16 to 19" on south/southwest aspect slopes greater than 15% gradient.

EMSG E - Sites receiving an AAP of 16 to 19"; or an AAP of 13 to 15" in a water run-in position or on north/northeast aspect slopes greater than 15% gradient; or an AAP of 20 to 24" on south/southwest aspect slopes greater than 15% gradient.

EMSG F - Sites receiving an AAP of 20 to 24"; or an AAP of 16 to 19" in a water run-in position or on north/northeast aspect slopes greater than 15% gradient; or an AAP of 25 to 29" on south/southwest aspect slopes greater than 15% gradient.

EMSG G - Sites receiving an AAP of 25 to 29"; or an AAP of 20 to 24" in a water run-in position or on north/northeast aspect slopes greater than 15% gradient; or an AAP of greater than 30" on south/southwest aspect slopes greater than 15% gradient.

EMSG H - Sites receiving an AAP of greater than 30"; or an AAP of 25 to 29" in a water run-in position or on north/northeast aspect slopes greater than 15% gradient.

EMSG I - Sites that are irrigated throughout the growing season to a depth and frequency commensurate with the needs of the particular species.

GUIDE to MISS Soil Groups

The matrix below is designed as a "fall through" chart to determine the grouping of a particular soil. A basic understanding of the chart's soil science terms by the user is assumed (assistance from the SCS state soils staff is available). To use the matrix, compare the soil's properties and characteristics with those of group 1, 1K, and so on. "Fall through" the chart until a match is found.

SOIL GROUP NAME	Group Symbol	Texture Class	Rock Fragments (% by Vol.)	Available Water Capacity (in. per inch profile)	Free Carbonates (upper 12 in.)	pH (upper 12 in.)	Electrical Conductivity (upper 12 in.)	Soil Drainage	Artificial Drainage	Flooding or Run-in	Water Table During Growing Season (ft.)	
WET, FAVORABLE	1	Loamy	0-35	≥40	≥7.5	None	≤ 7.8	≤ 2 mmhos/cm	Well, mod. well, somewhat poorly	None	Yes	≥2.0 <3.0
WET, FAVORABLE, CARBONATES	1K	Loamy	0-35	≥40	≥7.5	Yes	7.9-9.0	≤ 4 mmhos/cm	Well, mod. well, somewhat poorly	None	Yes; frequent	≥2.0 <3.0
WET, DRAINED	2	All, except Mucks	0-60	≥20	≥2.0	None	≤ 7.8	≤ 2 mmhos/cm	V. poorly, poorly, somewhat poorly	Yes	Yes	≥1.5 <3.0
WET, DRAINED, CARBONATES	2K	All, except Mucks	0-60	≥40	≥2.0	Yes	7.9-9.0	≤ 4 mmhos/cm	Very poorly, poorly	Yes	Yes	≥1.5 <3.0
WET, DRAINED, HISTOSOLS	2H	Muck surface 16" thick	Any, in layers beneath	≥40	≥7.5	None	≤ 7.8	≤ 2 mmhos/cm	Very poorly	Yes	Yes	≥1.5 <3.0
LOAMY	3	Loamy	0-35	≥40	≥7.5	None	≤ 7.8	≤ 2 mmhos/cm	Well, moderately well	None	None	≥3.0
CLAYEY, FAVORABLE	4	8-20" of Loamy over Clayey or Clayey-Skeletal; Loamy or Loamy-Skeletal with 35+% clay	Any	≥40	≥5.0	None	≤ 7.8	≤ 2 mmhos/cm	Well, moderately well, somewhat poorly	None	Any	≥3.0
CLAYEY	4C	Clayey; 0-8" Loamy over Clayey	Any	≥20	≥3.75	None	≤ 7.8	≤ 2 mmhos/cm	Well, mod. well, somewhat poorly	None	Any	≥3.0
DROUGHTY	5	Loamy; Loamy-skeletal	Any	≥40	3.75-7.5	None	≤ 7.8	≤ 2 mmhos/cm	Well, mod. well, somewhat poorly	None	Any	≥3.0
DROUGHTY, CARBONATES	5K	Loamy; Loamy-skeletal	Any	≥40	3.75-7.5	Yes	7.9-9.0	≤ 4 mmhos/cm	Well, mod. well, somewhat poorly	None	Any	≥3.0

SOIL GROUP NAME	Group Symbol	Texture Class	Rock Fragments (X by Vol.)	Soil Depth (in.)	Available Water Capacity (in. per total profile)	Free Carbonates (upper 12 in.)	pH (upper 12 in.)	Electrical Conductivity (upper 12 in.)	Soil Drainage	Artificial Drainage	Flooding or Run-in	Water Table During Growing Season (in.)
VERY DROUGHTY	6 (*)	Loamy; Loamy-skeletal; Sandy; Sandy-skeletal	Any	≥20	2.0-3.75	None	≤ 7.8	≤ 2 mmhos/cm	Excessive, somewhat excessive,	None	Any	≥3.0
VERY DROUGHTY CARBONATES	6K (*)	Loamy; Loamy-skeletal; Sandy; Sandy-skeletal	Any	≥20	2.0-3.75	Yes	7.9-9.0	≤ 4 mmhos/cm	Excessive, somewhat well, mod. well	None	Any	≥3.0
MODERATELY DEEP, FAVORABLE	6R	Loamy; Clayey-skeletal; Loamy-skeletal	Any	20-40	≥3.75	None	≤ 7.8	≤ 2 mmhos/cm	Well, moderately well, somewhat poorly	None	Any	≥3.0
MOD. DEEP, CARBONATES	6RK	Loamy; Clayey-skeletal; Loamy-skeletal	Any	20-40	≥3.75	Yes	7.9-9.0	≤ 4 mmhos/cm	Well, moderately well, somewhat poorly	None	Any	≥3.0
SANDY	7 (**)	Sandy (incl. arenic & gross arenic subgroups)	0-35	≥40	≥2.0	None	≤ 7.8	≤ 2 mmhos/cm	Excessive, somewhat well, mod. well	None	Any	≥3.0
LOAMY, CARBONATES	8	Loamy	0-35	≥40	≥7.5	Yes	7.9-9.0	≤ 4 mmhos/cm	Well, mod. well, somewhat poorly	None	None	≥3.0
MET, SALINE/ALKALINE	9B	Any	Any	≥20	≥2.0	Yes	≥ 7.8	4-16 mmhos/cm	Mod. well, somewhat poorly, poorly	Any	Any	≥1.5 ≤5.0
DRY, SALINE/ALKALINE	9N	Clayey; 0-8" Loamy over Clayey	0-35	≥20	≥3.75	Yes	≥ 7.8	4-16 mmhos/cm	Well	None	None	≥5.0
DRY, SALINE/ALKALINE, FAVORABLE	9NL	Loamy; 8-20" Loamy over Clayey	0-35	≥20	≥3.75	Yes	≥ 7.8	4-16 mmhos/cm	Well	None	None	≥5.0
UNSUITED	10	One or more characteristics make windbreaks unsuited. On-site investigation may reveal the potential for certain tree and shrub species.										

* 20-40" depth for sandy soils; can have less than 2.0" of available water capacity if irrigated.

** Can have less than 2.0" of available water capacity if irrigated.

WISG INDEX

Step 1. Turn to the identified geographic area's set of tables.
Step 2. Within the set, turn to the specified page below.

Soil Group Symbol	Name	Page
1	WET, FAVORABLE	II-1
1K	WET, FAVORABLE, CARBONATES	II-3
2	WET, DRAINED	II-5
2H	WET, DRAINED, HISTOSOLS	II-7
2K	WET, DRAINED, CARBONATES	II-9
3	LOAMY	II-11
4	CLAYEY, FAVORABLE	II-13
4C	CLAYEY	II-15
5	DROUGHTY	II-17
5K	DROUGHTY, CARBONATES	II-19
6	VERY DROUGHTY	II-21
6K	VERY DROUGHTY, CARBONATES	II-23
6R	MODERATELY DEEP, FAVORABLE	II-25
6RK	MODERATELY DEEP, CARBONATES	II-27
7	SANDY	II-29
8	LOAMY, CARBONATES	II-31
9G	WET, SALINE/ALKALINE	II-33
9N	DRY, SALINE/ALKALINE	II-35
9NL	DRY, SALINE/ALKALINE, FAVORABLE	II-37
10	UNSUITED	II-39

INSTRUCTIONS

DETERMINING NEVADA WINDBREAK SUITABILITY GROUPS (WISG)

Section II-I, FOTG

1. Identify the planting site's soil.
2. Look up the identified soil's WISG in part III (last section) of the WISG packet. Be sure to note the MLRA. MLRA's have been combined into 3 geographic groups. Each group has a unique set of tables which list adapted tree and shrub species and their expected 10 and 20 year heights.
3. Turn to the applicable page number in the appropriate set of tables to determine the list of adapted species and heights.
4. For soil inclusions or soils that have been altered (land smoothing, drainage, erosion, etc.), follow instructions in part I of the WISG packet to classify the soil and determine adapted species and heights.

WINDBREAK SOIL GROUP 1
(Wet, Favorable)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and subject to frequent flooding, run in, or a seasonal high water table. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
Evergreen Trees:																			
Austrian pine	--	--	--	--	10	20	10	22	11	24	12	26	13	27	16	34			
Blue spruce	--	--	--	--	11	22	12	23	--	--	--	--	--	--	18	36			
Douglas-fir	--	--	--	--	11	22	12	23	--	--	--	--	--	--	18	36			
Eastern redcedar	--	--	--	7	15	7	17	8	18	--	--	--	--	--	--	12	28		
Lodgepole pine	--	--	--	--	10	20	10	22	--	--	--	--	--	--	16	34			
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	24			
Norway spruce	--	--	--	--	11	22	12	23	--	--	--	--	--	--	18	36			
Ponderosa pine	--	--	--	--	10	20	10	22	--	--	--	--	--	--	16	34			
Rocky Mountain Juniper	--	--	--	7	15	7	17	8	18	--	--	--	--	--	--	12	28		
Scotch pine	--	--	--	--	11	23	12	25	--	--	--	--	--	--	19	38			
Singleleaf pinyon	--	--	--	6	13	6	14	6	16	--	--	--	--	--	--	10	24		
Southwestern pinyon	--	--	--	8	16	8	18	9	20	--	--	--	--	--	--	14	30		
Utah juniper	--	--	--	6	13	6	14	6	16	--	--	--	--	--	--	10	24		
Deciduous Trees:																			
Black locust	--	--	--	--	8	19	9	20	--	--	--	--	--	--	14	31			
Balleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	72			
Chinese elm	--	--	--	12	28	13	30	14	32	--	--	--	--	--	--	22	50		
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	54			
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18	36			
Green ash	--	--	--	--	11	22	12	23	--	--	--	--	--	--	18	36			
Hackberry	--	--	--	--	11	22	12	23	--	--	--	--	--	--	18	36			
Honey locust	--	--	--	8	17	8	19	9	20	--	--	--	--	--	--	14	31		
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	54	90			

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	54	90
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	12	28
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	18	36
Russian-olive	---	---	---	---	7	15	7	17	8	19	---	---	---	---	---	---	12	28
Siberian crabapple	---	---	---	---	---	---	7	17	8	19	---	---	---	---	---	---	12	28
Siberian elm	---	---	---	---	12	28	13	30	14	32	---	---	---	---	---	---	22	50
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	54	90
Shrubs:																		
American plum	---	---	---	---	---	---	4	8	4	9	---	---	---	---	---	---	6	14
Amur privet	---	---	---	---	---	---	4	7	5	8	---	---	---	---	---	---	7	12
Antelope bitterbrush	---	---	3	5	3	6	4	6	4	6	---	---	---	---	---	---	6	10
Big sagebrush	---	---	---	---	3	4	3	4	3	5	---	---	---	---	---	---	5	7
Bladder senna	---	---	---	---	3	6	4	6	4	6	---	---	---	---	---	---	6	10
Bush-type rose	---	---	---	---	---	---	4	6	4	6	---	---	---	---	---	---	6	10
Common chokecherry	---	---	---	---	4	7	4	7	5	8	---	---	---	---	---	---	7	12
Common lilac	---	---	---	---	4	7	4	7	5	8	---	---	---	---	---	---	7	12
European sage	---	---	---	---	3	4	3	4	3	5	---	---	---	---	---	---	5	7
Four-wing saltbush	2	5	2	5	3	6	3	6	3	6	---	---	---	---	---	---	5	10
Golden currant	---	---	---	---	4	7	4	7	5	8	---	---	---	---	---	---	7	12
Honeysuckle	---	---	---	---	4	7	4	7	5	8	---	---	---	---	---	---	7	12
Nanking cherry	---	---	---	---	---	---	4	7	5	8	---	---	---	---	---	---	7	12
Peking cotoneaster	---	---	---	---	---	---	4	7	5	8	---	---	---	---	---	---	7	12
Rabbitbrush	2	4	2	4	2	4	2	5	3	5	---	---	---	---	---	---	4	8
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	6	10
Sandcherry	---	---	---	---	3	6	3	6	3	6	---	---	---	---	---	---	5	10
Saskatoon serviceberry	---	---	---	---	3	6	3	6	3	6	---	---	---	---	---	---	5	10
Siberian peashrub	---	---	---	---	4	7	4	7	5	8	---	---	---	---	---	---	7	12
Silver buffaloberry	---	---	---	---	---	---	4	7	5	8	---	---	---	---	---	---	7	12
Skunkbush sumac	---	---	---	---	4	7	4	7	5	8	---	---	---	---	---	---	7	12

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 1K
(Wet, Favorable, Carbonates)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and subject to frequent flooding, run in, or a seasonal high water table. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, and an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Austrian pine	--	--	--	--	8	17	9	18	--	--	--	--	--	--	--	--	13	28
Blue spruce	--	--	--	--	9	18	10	20	--	--	--	--	--	--	--	--	15	30
Eastern redcedar	--	--	--	--	6	13	6	14	6	15	--	--	--	--	--	--	10	23
Lodgepole pine	--	--	--	--	8	17	9	18	--	--	--	--	--	--	--	--	13	28
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	20
Ponderosa pine	--	--	--	--	8	17	9	18	--	--	--	--	--	--	--	--	13	28
Rocky Mountain Juniper	--	--	--	--	6	13	6	14	6	15	--	--	--	--	--	--	10	23
Scotch pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	32
Utah juniper	--	--	--	--	4	11	5	12	5	13	--	--	--	--	--	--	8	20
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	7	16	8	17	--	--	--	--	--	--	--	--	12	26
Balkan poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30	60
Chinese elm	--	--	--	--	10	23	11	25	12	27	--	--	--	--	--	--	18	42
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	45
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	30
Green ash	--	--	--	--	9	18	10	20	--	--	--	--	--	--	--	--	15	30
Hackberry	--	--	--	--	9	18	10	20	--	--	--	--	--	--	--	--	15	30
Honey locust	--	--	--	--	7	14	7	16	8	17	--	--	--	--	--	--	12	26
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	45	75
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	45	75

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	10	23
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	15	30
Russian-olive	---	---	---	---	6	13	6	14	6	15	---	---	---	---	---	---	10	23
Siberian elm	---	---	---	---	10	23	11	25	12	27	---	---	---	---	---	---	18	42
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	45	75
Shrubs:																		
American plum	---	---	---	---	3	7	3	8	---	---	---	---	---	---	---	---	5	12
Bladder senna	---	---	---	---	3	4	3	5	3	5	---	---	---	---	---	---	5	8
Bush-type rose	---	---	---	---	---	---	3	5	3	5	---	---	---	---	---	---	5	8
Common lilac	---	---	---	---	3	6	4	6	4	6	---	---	---	---	---	---	6	10
European sage	---	---	---	---	2	3	2	4	2	4	---	---	---	---	---	---	4	6
Four-wing saltbush	2	4	2	4	2	4	2	5	2	5	---	---	---	---	---	---	4	8
Golden currant	---	---	---	---	3	6	4	6	4	6	---	---	---	---	---	---	6	10
Rabbitbrush	1	3	2	4	2	4	2	4	2	5	---	---	---	---	---	---	3	7
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	8
Siberian peashrub	---	---	---	---	3	7	4	7	4	8	---	---	---	---	---	---	6	12
Silver buffaloberry	---	---	---	---	---	---	4	6	4	6	---	---	---	---	---	---	6	10
Skunkbush sumac	---	---	---	---	3	6	4	6	4	6	---	---	---	---	---	---	6	10

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2
(Net, Drained)

Description and Limitations: Soils in this group are artificially drained phases of very poorly and poorly drained mineral soils. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Degree of wetness and drainage affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this groups. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Douglas-fir	--	--	--	--	--	--	8	16	9	18	--	--	--	--	--	--	14	27
Eastern redcedar	--	--	--	--	5	12	5	13	6	14	--	--	--	--	--	--	9	21
Lodgepole pine	--	--	--	--	--	--	7	15	8	16	--	--	--	--	--	--	12	25
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Ponderosa pine	--	--	--	--	--	--	7	15	8	16	--	--	--	--	--	--	12	25
Rocky Mountain Juniper	--	--	--	--	5	12	5	13	6	14	--	--	--	--	--	--	9	21
Scotch pine	--	--	--	--	--	--	8	17	9	19	--	--	--	--	--	--	14	29
Singleleaf pinyon	--	--	--	--	4	10	4	11	5	12	--	--	--	--	--	--	7	18
Southwestern pinyon	--	--	--	--	6	12	7	13	7	14	--	--	--	--	--	--	11	22
Utah juniper	--	--	--	--	4	10	4	11	5	12	--	--	--	--	--	--	7	18
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	7	14	7	15	--	--	--	--	--	--	11	23
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	54
Chinese elm	--	--	--	--	9	21	10	23	10	25	--	--	--	--	--	--	16	38
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18	40
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	27
Green ash	--	--	--	--	--	--	8	16	9	18	--	--	--	--	--	--	14	27
Hackberry	--	--	--	--	--	--	8	16	9	18	--	--	--	--	--	--	14	27
Honey locust	--	--	--	--	6	13	7	14	7	15	--	--	--	--	--	--	11	23
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	68

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	68
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	21
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	27
Russian-olive	--	--	--	5	13	5	14	6	15	--	--	--	--	--	--	--	9	23
Siberian crabapple	--	--	--	--	--	5	13	6	14	--	--	--	--	--	--	--	9	21
Siberian elm	--	--	--	9	21	10	23	10	25	--	--	--	--	--	--	--	16	38
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	68
<u>Shrubs:</u>																		
American plum	--	--	--	--	--	2	7	3	7	--	--	--	--	--	--	--	4	11
Amur privet	--	--	--	--	--	3	5	3	6	--	--	--	--	--	--	--	5	9
Antelope bitterbrush	--	--	2	4	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Big sagebrush	--	--	2	2	2	3	2	3	3	3	--	--	--	--	--	--	4	5
Bladder senna	--	--	--	--	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Bush-type rose	--	--	--	--	--	2	4	3	5	--	--	--	--	--	--	--	4	7
Common chokecherry	--	--	--	--	3	5	3	5	3	6	--	--	--	--	--	--	5	9
Common lilac	--	--	--	--	3	5	3	5	3	6	--	--	--	--	--	--	5	9
European sage	--	--	--	--	2	3	2	3	3	3	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	4	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Golden currant	--	--	--	--	3	5	3	5	3	6	--	--	--	--	--	--	5	9
Honeysuckle	--	--	--	--	3	5	3	5	3	6	--	--	--	--	--	--	5	9
Nanking cherry	--	--	--	--	--	3	5	3	6	--	--	--	--	--	--	--	5	9
Peking cotoneaster	--	--	--	--	--	3	5	3	6	--	--	--	--	--	--	--	5	9
Rabbitbrush	1	3	2	3	2	3	2	4	3	4	--	--	--	--	--	--	3	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	7
Sandcherry	--	--	--	--	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Saskatoon serviceberry	--	--	--	--	--	2	4	3	5	--	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	3	7	3	7	--	--	--	--	--	--	5	11
Silver buffaloberry	--	--	--	--	--	3	5	3	6	--	--	--	--	--	--	--	5	9
Skunkbush sumac	--	--	--	--	3	5	3	5	3	6	--	--	--	--	--	--	5	9

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2H
(Net, Drained, Histosols)

Description and Limitations: Soils in this group are artificially drained and have a muck surface layer greater than 16" thick. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Degree of wetness and drainage and a very high organic matter content affect the selection and growth of tree and shrub species. Limitations to machine planting and hand planting are slight. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Eastern redcedar	---	---	---	---	4	11	5	12	5	13	---	---	---	---	8	20	---	---
Lodgepole pine	---	---	---	---	---	---	7	14	7	16	---	---	---	---	11	24	---	---
Northern whitecedar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8	17	---	---
Norway spruce	---	---	---	---	---	---	8	16	8	17	---	---	---	---	13	26	---	---
Ponderosa pine	---	---	---	---	---	---	7	14	7	16	---	---	---	---	11	24	---	---
Rocky Mountain Juniper	---	---	---	---	4	11	5	12	5	13	---	---	---	---	8	20	---	---
Scotch pine	---	---	---	---	---	---	8	16	9	18	---	---	---	---	14	27	---	---
Singleleaf pinyon	---	---	---	---	4	9	4	10	5	11	---	---	---	---	7	17	---	---
Southwestern pinyon	---	---	---	---	6	12	6	13	6	14	---	---	---	---	10	21	---	---
Utah juniper	---	---	---	---	4	9	4	10	5	11	---	---	---	---	7	17	---	---
<u>Deciduous Trees:</u>																		
Black locust	---	---	---	---	---	---	6	13	6	14	---	---	---	---	10	22	---	---
Bolleana poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	26	51	---	---
Chinese elm	---	---	---	---	8	20	9	22	10	23	---	---	---	---	15	36	---	---
Fremont cottonwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	17	38	---	---
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	13	26	---	---
Green ash	---	---	---	---	---	---	8	16	8	17	---	---	---	---	13	26	---	---
Hackberry	---	---	---	---	---	---	8	16	8	17	---	---	---	---	13	26	---	---
Honey locust	---	---	---	---	6	12	6	13	6	14	---	---	---	---	10	22	---	---
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	38	68	---	---
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	38	64	---	---
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8	20	---	---
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	13	26	---	---
Russian-olive	---	---	---	---	4	11	5	12	5	13	---	---	---	---	8	20	---	---

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Siberian crabapple	---	---	---	---	5	12	5	13	---	---	---	---	---	---	---	---	8	20
Siberian elm	---	---	---	---	8	20	9	22	10	23	---	---	---	---	---	---	15	36
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	38	64
<u>Shrubs:</u>																		
American plum	---	---	---	---	2	6	3	6	---	---	---	---	---	---	---	---	4	10
Amur privet	---	---	---	---	3	5	3	5	---	---	---	---	---	---	---	---	5	8
Bladder senna	---	---	---	---	2	4	2	4	3	5	---	---	---	---	---	---	4	7
Bush-type rose	---	---	---	---	2	4	3	5	---	---	---	---	---	---	---	---	4	7
Common chokecherry	---	---	---	---	3	4	3	5	3	5	---	---	---	---	---	---	5	8
Common lilac	---	---	---	---	3	4	3	5	3	5	---	---	---	---	---	---	5	8
European sage	---	---	---	---	2	3	2	3	2	3	---	---	---	---	---	---	3	5
Four-wing saltbush	1	3	2	4	2	4	2	4	2	5	---	---	---	---	---	---	3	7
Golden currant	---	---	---	---	3	4	3	5	3	5	---	---	---	---	---	---	5	8
Honeysuckle	---	---	---	---	3	4	3	5	3	5	---	---	---	---	---	---	5	8
Nanking cherry	---	---	---	---	3	5	3	5	---	---	---	---	---	---	---	---	5	8
Peking cotoneaster	---	---	---	---	3	5	3	5	---	---	---	---	---	---	---	---	5	8
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	---	---	---	---	---	---	3	6
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4	7
Sandcherry	---	---	---	---	2	4	2	4	2	5	---	---	---	---	---	---	3	7
Saskatoon serviceberry	---	---	---	---	2	4	2	5	---	---	---	---	---	---	---	---	3	7
Siberian peashrub	---	---	---	---	3	6	3	6	3	6	---	---	---	---	---	---	5	10
Silver buffaloberry	---	---	---	---	3	5	3	5	---	---	---	---	---	---	---	---	5	8
Skunkbush sumac	---	---	---	---	3	4	3	5	3	5	---	---	---	---	---	---	5	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2K
(Wet, Drained, Carbonates)

Description and Limitations: Soils in this group are artificially drained phases of very poorly and poorly drained mineral soils. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Degree of wetness and drainage, free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this groups. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8 17
Utah juniper	--	--	--	4 9	4 10	5 11	--	--	--	--	--	--	--	--	--	--	--	7 17
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	6 13	6 14	--	--	--	--	--	--	--	--	10	22	--	--
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	26 51
Chinese elm	--	--	--	8 20	9 22	10 23	--	--	--	--	--	--	--	--	--	--	--	15 36
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17 38
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13 26
Green ash	--	--	--	--	8 16	8 17	--	--	--	--	--	--	--	--	--	--	--	13 26
Hackberry	--	--	--	--	8 16	8 17	--	--	--	--	--	--	--	--	--	--	--	13 26
Honey locust	--	--	--	6 12	6 13	6 14	--	--	--	--	--	--	--	--	--	--	--	10 22
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38 64
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38 64
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8 20
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13 26
Russian-olive	--	--	--	4 11	5 12	5 13	--	--	--	--	--	--	--	--	--	--	--	8 20
Siberian elm	--	--	--	8 20	9 22	10 23	--	--	--	--	--	--	--	--	--	--	--	15 36
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38 64

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Shrubs:																		
American plum	--	--	--	--	--	--	2	6	3	6	--	--	--	--	--	--	4	10
Bladder senna	--	--	--	--	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Bush-type rose	--	--	--	--	--	--	2	4	3	5	--	--	--	--	--	--	4	7
Common lilac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
European sage	--	--	--	--	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Four-wing saltbush	1	3	2	4	2	4	2	4	2	5	--	--	--	--	--	--	3	7
Golden currant	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Honeysuckle	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	3	6	3	6	--	--	--	--	--	--	5	10
Silver buffaloberry	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Skunkbush sumac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:

A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 3
(Loamy)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and are moderately well or well drained; also included are moderately well or well drained clayey soils with a loamy surface mantle greater than 20 inches. Available water capacity (AWC) to 60" is greater than 7.5. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Austrian pine	--	--	--	--	8	19	9	20	10	22	10	23	11	25	14	31		
Blue spruce	--	--	--	--	10	20	10	21	--	--	--	--	--	--	16	33		
Douglas-fir	--	--	--	--	10	20	10	21	--	--	--	--	--	--	16	33		
Eastern redcedar	--	--	--	--	6	14	7	15	7	16	--	--	--	--	11	25		
Lodgepole pine	--	--	--	--	8	19	9	20	--	--	--	--	--	--	14	31		
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	22		
Norway spruce	--	--	--	--	10	20	10	21	--	--	--	--	--	--	16	33		
Ponderosa pine	--	--	--	--	8	19	9	20	--	--	--	--	--	--	14	31		
Rocky Mountain Juniper	--	--	--	--	6	14	7	15	7	16	--	--	--	--	11	25		
Scotch pine	--	--	--	--	11	21	12	23	--	--	--	--	--	--	18	35		
Singleleaf pinyon	--	--	--	--	5	12	5	13	6	14	--	--	--	--	9	22		
Southwestern pinyon	--	--	--	--	7	15	8	17	8	18	--	--	--	--	13	28		
Utah juniper	--	--	--	--	5	12	5	13	6	14	--	--	--	--	9	22		
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	8	17	8	19	--	--	--	--	--	--	13	29		
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	66		
Chinese elm	--	--	--	--	11	25	12	28	13	30	--	--	--	--	20	46		
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	50		
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	33		
Green ash	--	--	--	--	10	20	10	21	--	--	--	--	--	--	16	33		
Hackberry	--	--	--	--	10	20	10	21	--	--	--	--	--	--	16	33		
Honey locust	--	--	--	--	7	16	8	17	8	19	--	--	--	--	13	29		

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	82
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	82
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	25
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	33
Russian-olive	--	--	--	--	6	14	7	15	7	16	--	--	--	--	--	--	11	25
Siberian crabapple	--	--	--	--	--	--	7	15	7	16	--	--	--	--	--	--	11	25
Siberian elm	--	--	--	--	11	25	12	28	13	30	--	--	--	--	--	--	20	46
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	82
<u>Shrubs:</u>																		
American plum	--	--	--	--	--	--	4	8	4	8	--	--	--	--	--	--	6	13
Amur privet	--	--	--	--	--	--	4	7	5	7	--	--	--	--	--	--	7	11
Antelope bitterbrush	--	--	3	4	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Big sagebrush	--	--	2	4	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Bladder senna	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Bush-type rose	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Common chokecherry	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Common lilac	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
European sage	--	--	--	--	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Four-wing saltbush	2	4	2	4	2	5	2	5	3	6	--	--	--	--	--	--	4	9
Golden currant	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Honeysuckle	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Nanking cherry	--	--	--	--	--	--	4	7	5	7	--	--	--	--	--	--	7	11
Peking cotoneaster	--	--	--	--	--	--	4	7	5	7	--	--	--	--	--	--	7	11
Rabbitbrush	1	4	2	4	2	4	2	5	2	5	--	--	--	--	--	--	3	8
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	9
Sandcherry	--	--	--	--	2	5	2	5	3	6	--	--	--	--	--	--	4	9
Saskatoon serviceberry	--	--	--	--	--	--	2	5	3	6	--	--	--	--	--	--	4	9
Siberian peashrub	--	--	--	--	4	7	4	8	5	8	--	--	--	--	--	--	7	13
Silver buffaloberry	--	--	--	--	--	--	4	7	5	7	--	--	--	--	--	--	7	11
Skunkbush sumac	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 4
(Clayey, Favorable)

Description and Limitations: Soils in this group are deep to very deep, clayey and clayey-skeletal with an 8 to 20 inch loamy surface mantle, or loamy or loamy-skeletal with greater than 35% clay content; and are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils with surface layers having greater than 35% rock fragments.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Evergreen Trees:																		
Austrian pine	--	--	--	--	6	13	6	14	7	15	8	16	8	18	10	22		
Blue spruce	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24		
Douglas-fir	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24		
Eastern redcedar	--	--	--	4	10	5	11	5	12	--	--	--	--	--	8	18		
Lodgepole pine	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	22		
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7	16		
Norway spruce	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24		
Ponderosa pine	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	22		
Rocky Mountain Juniper	--	--	--	4	10	5	11	5	12	--	--	--	--	--	8	18		
Scotch pine	--	--	--	--	8	16	8	17	--	--	--	--	--	--	13	26		
Singleleaf pinyon	--	--	--	3	9	4	10	4	10	--	--	--	--	--	6	16		
Southwestern pinyon	--	--	--	4	11	5	12	5	13	--	--	--	--	--	10	20		
Utah juniper	--	--	--	3	9	4	10	4	10	--	--	--	--	--	6	16		
Deciduous Trees:																		
Black locust	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21		
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	48		
Chinese elm	--	--	--	8	19	8	20	9	21	--	--	--	--	--	14	34		
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	36		
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24		
Green ash	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24		

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Hackberry	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Honey locust	--	--	--	--	6	12	6	13	6	14	--	--	--	--	--	--	10	21
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	60
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	60
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24
Russian-olive	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Siberian crabapple	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Siberian elm	--	--	--	--	8	19	8	20	9	21	--	--	--	--	--	--	14	34
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	60

Shrubs:

American plum	--	--	--	--	--	--	2	6	3	6	--	--	--	--	--	--	4	10
Amur privet	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Antelope bitterbrush	--	--	2	3	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Big sagebrush	--	--	2	2	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Bladder senna	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Bush-type rose	--	--	--	--	--	--	2	4	3	5	--	--	--	--	--	--	4	6
Common chokecherry	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Common lilac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
European sage	--	--	--	--	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Four-wing saltbush	1		2		2	3	2	4	2	4	--	--	--	--	--	--	3	6
Golden currant	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Honeysuckle	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Nanking cherry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	8
Peking cotoneaster	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	8
Rabbitbrush	1	3	1	3	1	3	1	4	1	4	--	--	--	--	--	--	2	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6
Sandcherry	--	--	--	--	2	2	2	4	2	4	--	--	--	--	--	--	3	6
Saskatoon serviceberry	--	--	--	--	--	--	2	4	2	4	--	--	--	--	--	--	3	6
Siberian peashrub	--	--	--	--	3	6	3	6	3	6	--	--	--	--	--	--	5	10
Silver buffaloberry	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Skunkbush sumac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 4C
 (Clayey)

Description and Limitations: Soils in this group have a fine earth fraction that is greater than 35% clay throughout. Soils with loamy surface layers less than 8 inches thick over clayey or clayey-skeletal layers are also included. They are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. High clay content affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils with surface layers having greater than 35% rock fragments. Because of high clay content, extra care will be needed to make sure soil around roots is firmly packed after planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Blue spruce	---	---	---	---	---	---	7	13	7	14	---	---	---	---	---	---	11	22
Eastern redcedar	---	---	---	4	9	---	5	10	5	11	---	---	---	---	---	---	8	17
Lodgepole pine	---	---	---	---	---	---	6	13	6	14	---	---	---	---	---	---	10	21
Norway spruce	---	---	---	---	---	---	7	13	7	14	---	---	---	---	---	---	11	22
Ponderosa pine	---	---	---	---	---	---	6	13	6	14	---	---	---	---	---	---	10	21
Rocky Mountain Juniper	---	---	---	4	9	---	5	10	5	11	---	---	---	---	---	---	8	17
Scotch pine	---	---	---	---	---	---	7	14	8	16	---	---	---	---	---	---	12	24
Utah juniper	---	---	---	3	8	---	4	9	4	10	---	---	---	---	---	---	6	15
<u>Deciduous Trees:</u>																		
Black locust	---	---	---	---	---	---	5	12	6	13	---	---	---	---	---	---	9	20
Bolleana poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	22	45
Chinese elm	---	---	---	8	18	---	8	19	9	21	---	---	---	---	---	---	14	32
Fremont cottonwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	15	34
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	22
Green ash	---	---	---	---	---	---	7	13	7	14	---	---	---	---	---	---	11	22
Hackberry	---	---	---	---	---	---	7	13	7	14	---	---	---	---	---	---	11	22
Honey locust	---	---	---	5	11	---	5	12	6	13	---	---	---	---	---	---	9	20
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	34	56

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	56
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	22
Russian-olive	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	--	8	17
Siberian crabapple	--	--	--	--	--	5	10	5	11	--	--	--	--	--	--	--	8	17
Siberian elm	--	--	--	8	18	8	19	9	21	--	--	--	--	--	--	--	14	32
<u>Shrubs:</u>																		
Amur privet	--	--	--	--	--	2	5	3	5	--	--	--	--	--	--	--	4	8
Antelope bitterbrush	--	--	2	3	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Big sagebrush	--	--	2	2	2	2	2	2	2	2	--	--	--	--	--	--	3	4
Bladder senna	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Bush-type rose	--	--	--	--	--	--	2	4	3	5	--	--	--	--	--	--	4	6
Common chokecherry	--	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Common lilac	--	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8
European sage	--	--	--	--	2	2	2	2	2	3	--	--	--	--	--	--	3	4
Four-wing saltbush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Golden currant	--	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Honeysuckle	--	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Nanking cherry	--	--	--	--	--	--	2	5	3	5	--	--	--	--	--	--	4	8
Peking cotoneaster	--	--	--	--	--	--	2	5	3	5	--	--	--	--	--	--	4	8
Rabbitbrush	1	2	1	2	1	3	1	3	1	3	--	--	--	--	--	--	2	5
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6
Sandcherry	--	--	--	--	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Siberian peashrub	--	--	--	--	2	5	2	5	3	6	--	--	--	--	--	--	4	9
Silver buffaloberry	--	--	--	--	--	--	2	5	3	5	--	--	--	--	--	--	4	8
Skunkbush sumac	--	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 5
(Droughty)

Description and Limitations: Soils in this group are deep to very deep, and loamy and loamy-skeletal with moderate and moderately high available water capacities (AMC to 60" is 3.75 to 7.5"). They are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Austrian pine	--	--	--	--	--	--	6	13	6	14	7	15	8	16	8	18	10	22
Blue spruce	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	--	12
Douglas-fir	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	--	12
Eastern redcedar	--	--	--	--	4	10	4	11	4	12	--	--	--	--	--	--	--	8
Lodgepole pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	--	10
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7
Norway spruce	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	--	12
Ponderosa pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	--	10
Rocky Mountain Juniper	--	--	--	--	4	10	4	11	4	12	--	--	--	--	--	--	--	8
Scotch pine	--	--	--	--	--	--	8	16	8	17	--	--	--	--	--	--	--	13
Singleleaf pinyon	--	--	--	--	3	9	4	10	4	10	--	--	--	--	--	--	--	6
Southwestern pinyon	--	--	--	--	6	11	6	12	6	13	--	--	--	--	--	--	--	10
Utah juniper	--	--	--	--	3	9	4	10	4	10	--	--	--	--	--	--	--	6
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	--	10
Boileana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24
Chinese elm	--	--	--	--	8	19	8	20	9	22	--	--	--	--	--	--	--	14
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12
Green ash	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	--	12
Hackberry	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	--	12

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Honey locust	--	--	--	--	6	12	6	13	6	14	--	--	--	--	--	--	10	21
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	60
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	60
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24
Russian-olive	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Siberian crabapple	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Siberian elm	--	--	--	--	8	19	8	20	9	22	--	--	--	--	--	--	14	34
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	60
<u>Shrubs:</u>																		
American plum	--	--	--	--	--	--	2	6	3	6	--	--	--	--	--	--	4	10
Amur privet	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Antelope bitterbrush	--	--	2	3	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Big sagebrush	--	--	2	2	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Bladder senna	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Bush-type rose	--	--	--	--	--	--	2	4	3	4	--	--	--	--	--	--	4	6
Common chokecherry	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Common lilac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
European sage	--	--	--	--	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Four-wing saltbush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Golden currant	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Honeysuckle	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Nanking cherry	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Peking cotoneaster	--	--	--	--	--	--	3	5	3	4	--	--	--	--	--	--	5	8
Rabbitbrush	1	3	1	3	1	3	1	4	1	4	--	--	--	--	--	--	2	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6
Sandcherry	--	--	--	--	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Saskatoon serviceberry	--	--	--	--	--	--	2	4	2	4	--	--	--	--	--	--	3	6
Siberian peashrub	--	--	--	--	3	6	3	6	3	6	--	--	--	--	--	--	5	10
Silver buffaloberry	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Skunkbush sumac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 5K
(Droughty, Carbonates)

Description and Limitations: Soils in this group are deep to very deep, loamy and loamy-skeletal with moderate and moderately high available water capacities (AWC to 60" is 3.75 to 7.5"). They are somewhat poorly, moderately well or well drained. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Blue spruce	--	--	--	--	--	--	7	13	7	14	--	--	--	--	--	--	11	22
Eastern redcedar	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	17
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7	15
Rocky Mountain Juniper	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	17
Utah juniper	--	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	6	15
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	5	12	6	13	--	--	--	--	--	--	9	20
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	45
Chinese elm	--	--	--	--	8	18	8	19	9	21	--	--	--	--	--	--	14	32
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	34
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	22
Green ash	--	--	--	--	--	--	7	13	7	14	--	--	--	--	--	--	11	22
Hackberry	--	--	--	--	--	--	7	13	7	14	--	--	--	--	--	--	11	22
Honey locust	--	--	--	--	5	11	5	12	6	13	--	--	--	--	--	--	9	20
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	56
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	56
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	17
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	22
Russian-olive	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	17

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Siberian elm	--	--	--	8	18	8	19	9	21	--	--	--	--	--	--	14	32	
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	56	
<u>Shrubs:</u>																		
American plum	--	--	--	--	2	5	3	6	--	--	--	--	--	--	--	4	9	
Bladder senna	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6	
Bush-type rose	--	--	--	--	2	4	2	4	3	4	--	--	--	--	--	4	6	
Common lilac	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8	
European sage	--	--	--	2	2	2	2	2	3	--	--	--	--	--	--	3	4	
Four-wing saltbush	2	4	2	4	2	4	2	5	3	5	--	--	--	--	--	4	8	
Golden currant	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8	
Honeysuckle	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8	
Rabbitbrush	1	2	1	2	1	3	1	3	1	3	--	--	--	--	--	2	5	
Siberian peashrub	--	--	--	2	5	2	5	3	6	--	--	--	--	--	--	4	9	
Silver buffaloberry	--	--	--	--	2	5	2	5	3	5	--	--	--	--	--	4	8	
Skunkbush sumac	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6
(Very Droughty)

Description and Limitations: Soils in this group are moderately deep to very deep; have loamy, loamy-skeletal, sandy, or sandy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 2.0 to 3.75" (can be less than 2.0" AWC if an irrigated phase of a soil). In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low AWC affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Austrian pine	--	--	--	--	--	--	5	12	6	13	6	14	7	15	7	16	9	20
Blue spruce	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Douglas-fir	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Eastern redcedar	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
Lodgepole pine	--	--	--	--	--	--	5	12	6	13	--	--	--	--	--	--	9	20
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	14
Norway spruce	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Ponderosa pine	--	--	--	--	--	--	5	12	6	13	--	--	--	--	--	--	9	20
Rocky Mountain Juniper	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
Scotch pine	--	--	--	--	--	--	7	13	7	14	--	--	--	--	--	--	11	22
Singleleaf pinyon	--	--	--	--	3	8	4	8	4	9	--	--	--	--	--	--	6	14
Southwestern pinyon	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Utah juniper	--	--	--	--	3	8	4	8	4	9	--	--	--	--	--	--	6	14
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	21	42
Chinese elm	--	--	--	--	7	16	8	17	8	19	--	--	--	--	--	--	13	29
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	31
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	21
Green ash	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Hackberry	---	---	---	---	---	6	13	6	14	---	---	---	---	---	---	---	10	21
Honey locust	---	---	---	---	4	10	5	11	5	12	---	---	---	---	---	---	8	18
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	31	52
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	31	52
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	7	16
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	10	21
Russian-olive	---	---	---	---	4	9	4	10	5	10	---	---	---	---	---	---	7	16
Siberian crabapple	---	---	---	---	---	---	4	10	5	10	---	---	---	---	---	---	7	16
Siberian elm	---	---	---	---	7	16	8	17	8	19	---	---	---	---	---	---	13	29
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	31	52

Shrubs:

Amur privet	---	---	---	---	2	4	3	5	---	---	---	---	---	---	---	---	4	7
Antelope bitterbrush	---	2	3	2	3	2	4	3	4	---	---	---	---	---	---	---	4	6
Big sagebrush	---	2	2	2	2	2	2	2	3	---	---	---	---	---	---	---	3	4
Bladder senna	---	---	---	2	3	2	4	3	4	---	---	---	---	---	---	---	4	6
Bush-type rose	---	---	---	---	---	2	4	3	4	---	---	---	---	---	---	---	4	6
Common chokecherry	---	---	---	2	4	2	4	3	5	---	---	---	---	---	---	---	4	7
Common lilac	---	---	---	2	4	2	4	3	4	---	---	---	---	---	---	---	4	7
European sage	---	---	---	2	2	2	2	2	2	---	---	---	---	---	---	---	3	4
Four-wing saltbush	1	3	2	3	2	3	2	4	2	4	---	---	---	---	---	---	3	6
Golden currant	---	---	---	2	4	2	4	3	5	---	---	---	---	---	---	---	4	7
Honeysuckle	---	---	---	2	4	2	4	3	5	---	---	---	---	---	---	---	4	7
Nanking cherry	---	---	---	---	---	2	4	3	5	---	---	---	---	---	---	---	4	7
Peking cotoneaster	---	---	---	---	---	2	4	3	5	---	---	---	---	---	---	---	4	7
Rabbitbrush	1	2	1	2	1	3	1	3	1	3	---	---	---	---	---	---	2	5
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4	6
Sandcherry	---	---	---	2	3	2	4	2	4	---	---	---	---	---	---	---	3	6
Saskatoon serviceberry	---	---	---	---	---	2	4	2	4	---	---	---	---	---	---	---	3	6
Siberian peashrub	---	---	---	2	4	2	5	3	5	---	---	---	---	---	---	---	4	8
Silver buffaloberry	---	---	---	---	---	2	4	3	5	---	---	---	---	---	---	---	4	7
Skunkbush sumac	---	---	---	2	4	2	4	3	5	---	---	---	---	---	---	---	4	7

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:

A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6K
 (Very Droughty, Carbonates)

Description and Limitations: Soils in this group are moderately deep to very deep; have loamy, loamy-skeletal, sandy, or sandy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 2.0 to 3.75" (can be less than 2.0" AWC if in an irrigated subgroup). In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. A low AWC and free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Eastern redcedar	--	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	6	15
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	13
Rocky Mountain Juniper	--	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	6	15
Utah juniper	--	--	--	--	3	7	3	8	3	8	--	--	--	--	--	--	5	13
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	5	10	5	11	--	--	--	--	--	--	8	17
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	39
Chinese elm	--	--	--	--	7	15	7	16	8	18	--	--	--	--	--	--	12	27
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	29
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	20
Green ash	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Hackberry	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Honey locust	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	17
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	29	49
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	29	49
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	15
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	20
Russian-olive	--	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	6	15

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Siberian elm	--	--	--	--	7	15	7	16	8	18	--	--	--	--	--	--	12	27
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	29	49
<u>Shrubs:</u>																		
Bladder senna	--	--	--	--	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Bush-type rose	--	--	--	--	--	--	2	3	2	3	--	--	--	--	--	--	3	5
Common lilac	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
European sage	--	--	--	--	2	2	2	2	2	3	--	--	--	--	--	--	3	4
Four-wing saltbush	1	2	2	2	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Golden currant	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Honeysuckle	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Rabbitbrush	1	2	1	2	1	3	1	3	1	3	--	--	--	--	--	--	2	5
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	5
Siberian peashrub	--	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Silver buffaloberry	--	--	--	--	--	--	2	4	3	4	--	--	--	--	--	--	4	6
Skunkbush sumac	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6R
(Moderately Deep, Favorable)

Description and Limitations: Soils in this group are moderately deep; have loamy, clayey-skeletal, or loamy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 3.75" or greater. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low to moderately high AWC affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume).

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Blue spruce	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	11	22
Douglas-fir	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	11	22
Eastern redcedar	--	--	--	4	9	5	10	5	11	--	--	--	--	--	8	17	--	--
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7	15
Norway spruce	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	11	22
Ponderosa pine	--	--	--	--	6	13	6	14	--	--	--	--	--	--	--	--	10	21
Rocky Mountain Juniper	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	--	8	17
Singleleaf pinyon	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	--	6	15
Southwestern pinyon	--	--	--	5	10	5	11	6	12	--	--	--	--	--	--	--	9	19
Utah juniper	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	--	6	15
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	5	12	6	13	--	--	--	--	--	--	--	--	9	20
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	45
Chinese elm	--	--	--	8	18	8	19	9	21	--	--	--	--	--	--	--	14	32
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	34
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	22
Green ash	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	11	22
Hackberry	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	11	22
Honey locust	--	--	--	5	11	5	12	6	13	--	--	--	--	--	--	--	9	20

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	34	56	
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	34	56	
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8	17	
Russian-olive	---	---	---	4	9	---	5	10	---	5	11	---	---	---	---	---	8	17	
Siberian crabapple	---	---	---	---	---	---	5	10	---	5	11	---	---	---	---	---	8	17	
Siberian elm	---	---	---	8	18	---	8	19	---	9	21	---	---	---	---	---	14	32	
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	34	56	
Shrubs:																			
American plum	---	---	---	---	---	---	2	5	---	3	6	---	---	---	---	---	4	9	
Amur privet	---	---	---	---	---	---	2	5	---	3	5	---	---	---	---	---	4	8	
Antelope bitterbrush	---	2	3	---	2	3	---	2	4	---	3	4	---	---	---	---	4	6	
Big sagebrush	---	2	2	---	2	2	---	2	2	---	2	3	---	---	---	---	3	4	
Bladder senna	---	---	---	---	2	3	---	2	4	---	3	4	---	---	---	---	4	6	
Bush-type rose	---	---	---	---	---	---	---	2	4	---	3	4	---	---	---	---	4	6	
Common chokecherry	---	---	---	---	2	4	---	2	5	---	3	5	---	---	---	---	4	8	
Common lilac	---	---	---	---	2	4	---	2	5	---	3	5	---	---	---	---	4	8	
European sage	---	---	---	---	2	2	---	2	2	---	2	3	---	---	---	---	3	4	
Four-wing saltbush	1	3	---	2	3	---	2	4	---	2	4	---	---	---	---	---	3	6	
Golden currant	---	---	---	---	2	4	---	2	5	---	3	5	---	---	---	---	4	8	
Honeysuckle	---	---	---	---	2	4	---	2	5	---	3	5	---	---	---	---	4	8	
Nanking cherry	---	---	---	---	---	---	---	2	5	---	3	5	---	---	---	---	4	8	
Peking cotoneaster	---	---	---	---	---	---	---	2	5	---	3	5	---	---	---	---	4	8	
Rabbitbrush	1	2	---	1	2	---	1	3	---	1	3	---	---	---	---	---	2	5	
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4	6
Sandcherry	---	---	---	---	2	4	---	2	4	---	2	4	---	---	---	---	3	6	
Saskatoon serviceberry	---	---	---	---	---	---	---	2	4	---	2	4	---	---	---	---	3	6	
Siberian peashrub	---	---	---	---	2	5	---	2	5	---	3	6	---	---	---	---	4	9	
Silver buffaloberry	---	---	---	---	---	---	---	2	5	---	3	5	---	---	---	---	4	8	
Skunkbush sumac	---	---	---	---	2	4	---	2	8	---	3	5	---	---	---	---	4	8	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP GRK
(Moderately Deep, Carbonates)

Description and Limitations: Soils in this group are moderately deep; have loamy, clayey-skeletal, or loamy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 3.75" or greater. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. A low moderately high AWC and free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume).

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Evergreen Trees:

None

Deciduous Trees:

Black locust	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Chinese elm	--	--	--	--	7	16	8	18	8	20	--	--	--	--	13	29
Honey locust	--	--	--	--	4	10	5	11	5	12	--	--	--	--	8	18
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	52
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	52
Russian-olive	--	--	--	--	4	9	4	10	5	10	--	--	--	--	7	16
Siberian elm	--	--	--	--	7	16	8	18	8	20	--	--	--	--	13	29

Shrubs:

Bush-type rose	--	--	--	--	2	2	2	3	--	--	--	--	--	--	4	6
European sage	--	--	--	--	2	2	2	2	2	3	--	--	--	--	3	4

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Four-wing saltbush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	3	6	
Rabbitbrush	1	2	1	2	1	3	1	3	1	3	--	--	--	--	--	2	5	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 7
 (Sandy)

Description and Limitations: Soils in this group are deep to very deep and sandy throughout (includes arenic and gross arenic soil subgroups) and are moderately well, well somewhat excessive, or excessive drained. Available water capacity (AWC) to 60" is greater than 2.0. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low to moderate available water capacity affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Soil blowing at or near the planting site can adversely affect the health and vigor of developing windbreaks. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Evergreen Trees:

Austrian pine	--	--	--	--	--	--	5	12	6	13	6	14	7	15	7	16	9	20
Blue spruce	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Douglas-fir	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Eastern redcedar	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
Lodgepole pine	--	--	--	--	--	--	5	12	6	13	--	--	--	--	--	--	9	20
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	14
Ponderosa pine	--	--	--	--	--	--	5	12	6	13	--	--	--	--	--	--	9	20
Rocky Mountain Juniper	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
Scotch pine	--	--	--	--	--	--	7	13	7	14	--	--	--	--	--	--	11	22
Singleleaf pinyon	--	--	--	--	3	8	4	8	4	9	--	--	--	--	--	--	6	14
Southwestern pinyon	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Utah juniper	--	--	--	--	3	8	4	8	4	9	--	--	--	--	--	--	6	14

Deciduous Trees:

Black locust	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	21	42
Chinese elm	--	--	--	--	7	16	8	17	8	19	--	--	--	--	--	--	13	29
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	31
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	21
Green ash	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Hackberry	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Honey locust	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18	
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	52	
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	52	
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7	16	
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	21	
Russian-olive	--	--	--	7	9	8	10	8	10	--	--	--	--	--	--	7	16	
Siberian crabapple	--	--	--	--	--	8	10	8	10	--	--	--	--	--	--	7	16	
Siberian elm	--	--	--	7	16	8	17	8	19	--	--	--	--	--	--	13	29	
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31	52	

Shrubs:

American plum	--	--	--	2	5	3	5	--	--	--	--	--	--	4	8	
Amur privet	--	--	--	2	4	3	5	--	--	--	--	--	--	4	7	
Antelope bitterbrush	--	2	3	2	3	2	4	2	4	--	--	--	--	4	6	
Big sagebrush	--	2	2	2	2	2	2	2	3	--	--	--	--	3	4	
Bladder senna	--	--	--	2	3	2	4	3	4	--	--	--	--	4	6	
Bush-type rose	--	--	--	2	4	3	4	--	--	--	--	--	--	4	6	
Common chokecherry	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7	
Common lilac	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7	
European sage	--	--	--	2	2	2	2	2	3	--	--	--	--	3	4	
Four-wing saltbush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	3	6
Golden currant	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7	
Honeysuckle	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7	
Nanking cherry	--	--	--	2	4	3	5	--	--	--	--	--	--	4	7	
Peking cotoneaster	--	--	--	2	4	3	5	--	--	--	--	--	--	4	7	
Rabbitbrush	1	2	1	2	1	3	1	3	1	3	--	--	--	--	2	5
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6	
Sandcherry	--	--	--	2	3	2	4	2	4	--	--	--	--	3	6	
Saskatoon serviceberry	--	--	--	2	4	2	4	--	--	--	--	--	--	3	6	
Siberian peashrub	--	--	--	2	4	2	5	3	5	--	--	--	--	4	8	
Silver buffaloberry	--	--	--	2	4	3	5	--	--	--	--	--	--	4	7	
Skunkbush sumac	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 8
(Loamy, Carbonates)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and are moderately well or well drained; also included are clayey soils with a loamy surface mantle greater than 20 inches. Available water capacity (AWC) to 60" is greater than 7.5. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Evergreen Trees:

Blue spruce	---	---	---	---	9	18	10	20	---	---	---	---	---	---	---	15	30
Eastern redcedar	---	---	---	6	13	6	14	6	15	---	---	---	---	---	---	10	23
Lodgepole pine	---	---	---	---	---	8	17	8	18	---	---	---	---	---	---	13	28
Northern whitecedar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	9	20
Ponderosa pine	---	---	---	---	---	8	17	8	18	---	---	---	---	---	---	13	28
Rocky Mountain Juniper	---	---	---	6	13	6	14	6	15	---	---	---	---	---	---	10	23
Utah juniper	---	---	---	4	11	5	12	5	13	---	---	---	---	---	---	8	20

Deciduous Trees:

Black locust	---	---	---	---	7	16	8	17	---	---	---	---	---	---	---	12	26
Boyleana poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	30	60
Chinese elm	---	---	---	10	23	11	25	12	27	---	---	---	---	---	---	18	42
Fremont cottonwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20	45
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	15	30
Green ash	---	---	---	---	---	9	18	10	20	---	---	---	---	---	---	15	30
Hackberry	---	---	---	---	---	9	18	10	20	---	---	---	---	---	---	15	30
Honey locust	---	---	---	7	14	7	16	8	17	---	---	---	---	---	---	12	26
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	45	75
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	45	75
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	10	23
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	15	30

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Russian-olive	--	--	--	--	6	13	6	14	6	15	--	--	--	--	--	--	10	23
Siberian elm	--	--	--	--	10	23	11	25	12	27	--	--	--	--	--	--	18	42
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	45	75
Shrubs:																		
American plum	--	--	--	--	--	--	3	7	3	8	--	--	--	--	--	--	5	12
Bladder senna	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Bush-type rose	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Common lilac	--	--	--	--	3	6	4	6	4	6	--	--	--	--	--	--	6	10
European sage	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Four-wing saltbush	2	4	2	4	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Golden currant	--	--	--	--	3	6	4	6	4	6	--	--	--	--	--	--	6	10
Honeysuckle	--	--	--	--	3	6	4	6	4	6	--	--	--	--	--	--	6	10
Rabbitbrush	1	3	2	4	2	4	2	4	2	5	--	--	--	--	--	--	3	7
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	8
Siberian peashrub	--	--	--	--	3	7	4	7	4	8	--	--	--	--	--	--	6	12
Silver buffaloberry	--	--	--	--	--	--	4	6	4	6	--	--	--	--	--	--	6	10
Skunkbush sumac	--	--	--	--	3	6	4	6	4	6	--	--	--	--	--	--	6	10

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 96
 (Wet, Saline, Alkaline)

Description and Limitations: Soils in this group are moderately deep to very deep with a water table at 18 to 60" from the surface; some are subject to flooding or ponding. They are poorly, somewhat poorly, or moderately well drained (including artificially drained). In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume). Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
None																		
<u>Deciduous Trees:</u>																		
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	27
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	18
Green ash	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	9	18
Russian-olive	--	--	--	--	3	8	4	9	4	9	--	--	--	--	--	--	6	14
<u>Shrubs:</u>																		
Four-wing saltbush	1	2	1	2	1	3	1	3	1	3	--	--	--	--	--	--	2	5
Rabbitbrush	1	2	1	2	1	3	1	3	1	3	--	--	--	--	--	--	2	5
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	?

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

WINDBREAK SOIL GROUP 9N
(Dry, Saline, Alkaline)

Description and Limitations: Soils in this group are clayey, moderately deep to very deep, do not have a water table within 5 feet of the surface and are not subject to flooding or ponding. In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Because of high clay content, extra care will be needed to make sure soil around roots is firmly packed after planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
None																		
<u>Deciduous Trees:</u>																		
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	22
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	15
Green ash	--	--	--	--	--	--	5	9	5	10	--	--	--	--	--	--	8	15
Russian-olive	--	--	--	--	3	7	3	7	3	8	--	--	--	--	--	--	5	12
<u>Shrubs:</u>																		
Bladder senna	--	--	--	--	1	2	1	2	1	3	--	--	--	--	--	--	2	4
Four-wing saltbush	1	2	1	2	1	2	1	2	1	3	--	--	--	--	--	--	2	4
Honeysuckle	--	--	--	--	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Rabbitbrush	1	2	1	2	1	2	1	2	1	3	--	--	--	--	--	--	2	4
Siberian peashrub	--	--	--	--	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Silver buffaloberry	--	--	--	--	--	--	2	3	2	3	--	--	--	--	--	--	3	5

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

WINDBREAK SOIL GROUP 9M
 (Dry, Saline, Alkaline, Favorable)

Description and Limitations: Soils in this group are loamy or loamy over clayey, moderately deep to very deep, do not have a water table within 5 feet of the surface and are not subject to flooding or ponding. In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
None																		
<u>Deciduous Trees:</u>																		
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	25
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	16
Green ash	--	--	--	--	5	10	5	10	--	--	--	--	--	--	--	--	8	16
Russian-olive	--	--	--	--	3	7	4	8	4	8	--	--	--	--	--	--	6	13
<u>Shrubs:</u>																		
Bladder senna	--	--	--	--	2	2	2	2	2	3	--	--	--	--	--	--	3	4
Four-wing saltbush	1	2	1	2	1	2	1	2	1	3	--	--	--	--	--	--	2	4
Honeysuckle	--	--	--	--	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Rabbitbrush	1	2	1	2	1	2	1	2	1	3	--	--	--	--	--	--	2	4
Siberian peashrub	--	--	--	--	2	4	2	4	2	5	--	--	--	--	--	--	3	7
Silver buffaloberry	--	--	--	--	--	--	2	4	2	4	--	--	--	--	--	--	3	6

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ⁱ																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

WINDBREAK SOIL GROUP 10
(Unsuited)

Description and Limitations: Soils in this group have one or more characteristics such as soils depth, texture, drainage, available water capacity, or salts which severely limit planting, survival, or growth of trees and shrubs. Examples include very shallow and shallow soils, soils with a very low available water capacity (AWC is less than 2"), very poorly and poorly drained soils that are saturated or ponded throughout the growing season, and toxic salts. Soils in this group are not recommended for farmstead, feedlot or field windbreaks. However, onsite investigation may reveal that tree and shrub plantings can be made with special treatments such as irrigation and leaching of salts. The selection of species must then be tailored to the soil conditions existing at the altered site.

WINDBREAK SOIL GROUP 1
 (Met, Favorable)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and subject to frequent flooding, run in, or a seasonal high water table. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	---	---	---	---	---	---	8	17	8	19	---	---	---	---	---	---	13	29
Austrian pine	---	---	---	---	---	---	11	22	12	23	---	---	---	---	---	---	18	36
Blue spruce	---	---	---	---	---	---	11	23	12	25	---	---	---	---	---	---	19	38
Douglas-fir	---	---	---	---	---	---	11	24	12	26	---	---	---	---	---	---	19	40
Eastern redcedar	---	---	---	---	---	7	16	8	17	8	19	---	---	---	---	---	13	29
Giant sequoia	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	16	31
Jeffrey Pine	---	---	---	---	---	---	10	21	11	23	---	---	---	---	---	---	17	35
Lodgepole pine	---	---	---	---	---	---	10	21	11	23	---	---	---	---	---	---	17	35
Northern whitecedar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	13	29
Norway spruce	---	---	---	---	---	---	11	23	12	25	---	---	---	---	---	---	19	38
Ponderosa pine	---	---	---	---	---	---	10	21	11	23	---	---	---	---	---	---	17	35
Rocky Mountain Juniper	---	---	---	---	---	7	16	8	17	8	19	---	---	---	---	---	13	29
Scotch pine	---	---	---	---	---	---	10	21	11	23	---	---	---	---	---	---	17	35
Singleleaf pinyon	---	---	---	---	---	6	14	7	16	7	17	---	---	---	---	---	11	26
Southwestern pinyon	---	---	---	---	---	8	16	8	18	9	20	---	---	---	---	---	14	30
Utah juniper	---	---	---	---	---	6	14	7	16	7	17	---	---	---	---	---	11	26
<u>Deciduous Trees:</u>																		
Black locust	---	---	---	---	---	---	10	19	10	21	---	---	---	---	---	---	16	32
Bolleana poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	38	77
Chinese elm	---	---	---	---	---	13	29	14	32	16	34	---	---	---	---	---	24	53
Fremont cottonwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	26	58
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20	41
Green ash	---	---	---	---	---	---	12	25	13	27	---	---	---	---	---	---	20	41

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Hackberry	--	--	--	--	12	25	13	27	--	--	--	--	--	--	--	--	20	41
Honey locust	--	--	--	--	10	20	11	22	12	23	--	--	--	--	--	--	18	36
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	60	96
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	60	96
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	30
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	41
Russian-olive	--	--	--	--	8	16	8	18	9	20	--	--	--	--	--	--	14	30
Siberian crabapple	--	--	--	--	--	--	8	18	9	20	--	--	--	--	--	--	14	30
Siberian elm	--	--	--	--	13	30	14	32	16	35	--	--	--	--	--	--	24	54
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	60	96

Shrubs:

American plum	--	--	--	--	4	10	5	10	--	--	--	--	--	--	--	--	7	16
Amur privet	--	--	--	--	--	--	5	8	5	8	--	--	--	--	--	--	8	13
Antelope bitterbrush	--	--	4	6	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Big sagebrush	--	--	3	4	3	4	4	5	4	5	--	--	--	--	--	--	6	8
Bladder senna	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Bush-type rose	--	--	--	--	--	--	4	7	5	7	--	--	--	--	--	--	7	11
Common chokecherry	--	--	--	--	4	7	5	8	5	8	--	--	--	--	--	--	8	13
Common lilac	--	--	--	--	4	7	5	8	5	8	--	--	--	--	--	--	8	13
Euonymus	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
European sage	--	--	--	--	3	4	4	5	4	5	--	--	--	--	--	--	6	8
Four-wing saltbush	3	5	3	6	3	6	4	7	4	7	--	--	--	--	--	--	6	11
Golden currant	--	--	--	--	4	7	5	8	5	8	--	--	--	--	--	--	8	13
Honeysuckle	--	--	--	--	4	7	5	8	5	8	--	--	--	--	--	--	8	13
Nanking cherry	--	--	--	--	--	--	5	8	5	8	--	--	--	--	--	--	8	13
Peking cotoneaster	--	--	--	--	--	--	5	8	5	8	--	--	--	--	--	--	8	13
Rabbitbrush	2	5	2	5	3	6	3	6	3	6	--	--	--	--	--	--	5	10
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7	11
Sandcherry	--	--	--	--	3	6	4	7	4	7	--	--	--	--	--	--	6	11
Siberian peashrub	--	--	--	--	4	9	5	10	5	10	--	--	--	--	--	--	8	16
Silver buffaloberry	--	--	--	--	--	--	5	8	5	8	--	--	--	--	--	--	8	13
Skunkbush sumac	--	--	--	--	4	7	5	8	5	8	--	--	--	--	--	--	8	13

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:

A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 1K
 (Wet, Favorable, Carbonates)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and subject to frequent flooding, run in, or a seasonal high water table. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, and an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
<u>Evergreen Trees:</u>																			
Arizona cypress	---	---	---	---	7	14	7	16	---	---	---	---	---	---	---	---	---	11	24
Austrian pine	---	---	---	---	9	18	10	20	---	---	---	---	---	---	---	---	---	15	30
Blue spruce	---	---	---	---	10	19	10	21	---	---	---	---	---	---	---	---	---	16	32
Eastern redcedar	---	---	---	6	13	7	14	7	16	---	---	---	---	---	---	---	---	11	24
Lodgepole pine	---	---	---	---	8	17	9	19	---	---	---	---	---	---	---	---	---	14	29
Northern whitecedar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	24
Ponderosa pine	---	---	---	---	8	17	9	19	---	---	---	---	---	---	---	---	---	14	29
Rocky Mountain Juniper	---	---	---	6	13	7	14	7	16	---	---	---	---	---	---	---	---	11	24
Scotch pine	---	---	---	---	8	17	9	19	---	---	---	---	---	---	---	---	---	14	29
Utah juniper	---	---	---	5	12	5	13	6	14	---	---	---	---	---	---	---	---	9	22
<u>Deciduous Trees:</u>																			
Black locust	---	---	---	---	8	16	8	18	---	---	---	---	---	---	---	---	---	13	27
Bolleana poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	32	64
Chinese elm	---	---	---	11	24	12	26	13	29	---	---	---	---	---	---	---	---	20	44
Fremont cottonwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	22	48
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	17	34
Green ash	---	---	---	---	10	20	11	22	---	---	---	---	---	---	---	---	---	17	34
Hackberry	---	---	---	---	10	20	11	22	---	---	---	---	---	---	---	---	---	17	34
Honey locust	---	---	---	8	16	9	18	10	20	---	---	---	---	---	---	---	---	15	30
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	50	80
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	50	80

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	25
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	34
Russian-olive	--	--	--	--	7	14	7	15	8	16	--	--	--	--	--	--	12	25
Siberian crabapple	--	--	--	--	--	--	7	15	8	16	--	--	--	--	--	--	12	25
Siberian Elm	--	--	--	--	11	25	12	27	13	29	--	--	--	--	--	--	20	45
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
Shrubs:																		
American plum	--	--	--	--	--	--	4	8	4	8	--	--	--	--	--	--	6	13
Bladder senna	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Bush-type rose	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Common lilac	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Euonymus	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
European sage	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	--	5	7
Four-wing saltbush	2	4	2	4	3	5	3	5	3	6	--	--	--	--	--	--	5	9
Golden currant	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Honeysuckle	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Rabbitbrush	2	4	2	4	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	9
Siberian peashrub	--	--	--	--	4	7	4	8	4	8	--	--	--	--	--	--	7	13
Silver buffaloberry	--	--	--	--	--	--	4	7	5	7	--	--	--	--	--	--	7	11
Skunkbush sumac	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2
 (Wet, Drained)

Description and Limitations: Soils in this group are artificially drained phases of very poorly and poorly drained mineral soils. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Degree of wetness and drainage affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this groups. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Douglas-fir	--	--	--	--	8	18	9	20	--	--	--	--	--	--	--	--	14	30
Eastern redcedar	--	--	--	--	6	12	6	13	6	14	--	--	--	--	--	--	10	22
Giant sequoia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	23
Jeffrey Pine	--	--	--	--	8	16	8	17	--	--	--	--	--	--	--	--	13	26
Lodgepole pine	--	--	--	--	8	16	8	17	--	--	--	--	--	--	--	--	13	26
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	22
Ponderosa pine	--	--	--	--	8	16	8	17	--	--	--	--	--	--	--	--	13	26
Rocky Mountain Juniper	--	--	--	--	6	12	6	13	6	14	--	--	--	--	--	--	10	22
Scotch pine	--	--	--	--	8	16	8	17	--	--	--	--	--	--	--	--	13	26
Singleleaf pinyon	--	--	--	--	4	11	5	12	5	13	--	--	--	--	--	--	8	20
Southwestern pinyon	--	--	--	--	6	12	7	13	7	14	--	--	--	--	--	--	11	22
Utah juniper	--	--	--	--	4	11	5	12	5	13	--	--	--	--	--	--	8	20
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	7	14	8	16	--	--	--	--	--	--	--	--	12	24
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	29	58
Chinese elm	--	--	--	--	10	22	11	24	12	26	--	--	--	--	--	--	18	40
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	43
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	31
Green ash	--	--	--	--	9	19	10	20	--	--	--	--	--	--	--	--	15	31
Hackberry	--	--	--	--	9	19	10	20	--	--	--	--	--	--	--	--	15	31

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Honey locust	---	---	---	8	15	8	16	9	18	---	---	---	---	---	---	14	27	
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	45	72	
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	45	72	
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	22	
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	15	31	
Russian-olive	---	---	---	6	12	7	13	7	14	---	---	---	---	---	---	11	22	
Siberian crabapple	---	---	---	---	---	7	13	7	14	---	---	---	---	---	---	11	22	
Siberian elm	---	---	---	10	22	11	24	12	26	---	---	---	---	---	---	18	40	
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	45	72	
<u>Shrubs:</u>																		
American plum	---	---	---	---	---	3	7	3	8	---	---	---	---	---	---	5	12	
Amur privet	---	---	---	---	---	4	6	4	6	---	---	---	---	---	---	6	10	
Antelope bitterbrush	---	2	4	3	4	3	5	3	5	---	---	---	---	---	---	5	8	
Big sagebrush	---	2	3	2	3	2	4	3	4	---	---	---	---	---	---	4	6	
Bladder senna	---	---	---	3	4	3	5	3	5	---	---	---	---	---	---	5	8	
Bush-type rose	---	---	---	---	---	3	5	3	5	---	---	---	---	---	---	5	8	
Common chokecherry	---	---	---	3	6	4	6	4	6	---	---	---	---	---	---	6	10	
Common lilac	---	---	---	3	6	4	6	4	6	---	---	---	---	---	---	6	10	
European sage	---	---	---	2	3	2	4	3	4	---	---	---	---	---	---	4	6	
Four-wing saltbush	2	4	2	4	2	4	2	5	3	5	---	---	---	---	---	4	8	
Golden currant	---	---	---	3	6	4	6	4	6	---	---	---	---	---	---	6	10	
Honeysuckle	---	---	---	3	6	4	6	4	7	---	---	---	---	---	---	6	10	
Nanking cherry	---	---	---	---	---	4	6	4	7	---	---	---	---	---	---	6	10	
Peking cotoneaster	---	---	---	---	---	4	6	4	7	---	---	---	---	---	---	6	10	
Rabbitbrush	2	3	2	4	2	4	2	4	3	5	---	---	---	---	---	4	7	
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	8	
Sandcherry	---	---	---	2	4	2	5	3	5	---	---	---	---	---	---	4	8	
Siberian peashrub	---	---	---	3	7	4	7	4	8	---	---	---	---	---	---	6	12	
Silver buffaloberry	---	---	---	---	---	4	6	4	7	---	---	---	---	---	---	6	10	
Skunkbush sumac	---	---	---	3	6	4	6	4	7	---	---	---	---	---	---	6	10	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2H
 (Wet, Drained, Histosols)

Description and Limitations: Soils in this group are artificially drained and have a muck surface layer greater than 16" thick. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Degree of wetness and drainage and a very high organic matter content affect the selection and growth of tree and shrub species. Limitations to machine planting and hand planting are slight. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Evergreen Trees:

Douglas-fir	---	---	---	8	17	9	18	---	---	---	---	---	---	---	---	14	28
Eastern redcedar	---	---	5	11	5	12	6	13	---	---	---	---	---	---	---	9	20
Giant sequoia	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	22
Jeffrey Pine	---	---	---	7	15	8	16	---	---	---	---	---	---	---	---	12	25
Lodgepole pine	---	---	---	7	15	8	16	---	---	---	---	---	---	---	---	12	25
Northern whitecedar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	9	20
Ponderosa pine	---	---	---	7	15	8	16	---	---	---	---	---	---	---	---	12	25
Rocky Mountain Juniper	---	---	5	11	5	12	6	13	---	---	---	---	---	---	---	9	20
Scotch pine	---	---	---	7	15	8	16	---	---	---	---	---	---	---	---	12	25
Singleleaf pinyon	---	---	4	10	5	11	5	12	---	---	---	---	---	---	---	8	19
Southwestern pinyon	---	---	6	12	6	13	6	14	---	---	---	---	---	---	---	10	21
Utah juniper	---	---	4	10	5	11	5	12	---	---	---	---	---	---	---	8	19

Deciduous Trees:

Black locust	---	---	---	7	14	7	15	---	---	---	---	---	---	---	---	11	23
Bolleana poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	27	54
Chinese elm	---	---	9	20	10	22	11	24	---	---	---	---	---	---	---	17	37
Fremont cottonwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	19	41
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14	29
Green ash	---	---	---	8	17	9	19	---	---	---	---	---	---	---	---	14	29
Hackberry	---	---	---	8	17	9	19	---	---	---	---	---	---	---	---	14	29
Honey locust	---	---	7	14	8	16	8	17	---	---	---	---	---	---	---	13	26
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	42	68
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	42	68
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	10	21

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	29
Russian-olive	--	--	--	--	6	12	6	13	6	14	--	--	--	--	--	--	10	21
Siberian crabapple	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Siberian elm	--	--	--	--	9	21	10	23	11	25	--	--	--	--	--	--	17	38
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	68
<u>Shrubs:</u>																		
American plum	--	--	--	--	--	--	3	7	3	7	--	--	--	--	--	--	5	11
Amur privet	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Antelope bitterbrush	--	--	2	4	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Big sagebrush	--	--	2	3	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Bladder senna	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Bush-type rose	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Common chokecherry	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Common lilac	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
European sage	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Four-wing saltbush	2	4	2	4	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Golden currant	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Honeysuckle	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Nanking cherry	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Peking cotoneaster	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Rabbitbrush	1	3	2	4	2	4	2	4	2	5	--	--	--	--	--	--	3	7
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	8
Sandcherry	--	--	--	--	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Siberian peashrub	--	--	--	--	3	6	4	7	4	7	--	--	--	--	--	--	6	11
Silver buffaloberry	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Skunkbush sumac	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2K
 (Wet, Drained, Carbonates)

Description and Limitations: Soils in this group are artificially drained phases of very poorly and poorly drained mineral soils. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Degree of wetness and drainage, free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this groups. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9 20
Utah juniper	--	--	--	4 10	4 10	5 11	--	--	--	--	--	--	--	--	--	--	--	8 19
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	7 14	7 15	--	--	--	--	--	--	--	--	--	--	--	11 23
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27 54
Chinese elm	--	--	--	9 20	10 22	11 24	--	--	--	--	--	--	--	--	--	--	--	17 37
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19 41
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14 29
Green ash	--	--	--	--	8 17	9 19	--	--	--	--	--	--	--	--	--	--	--	14 29
Hackberry	--	--	--	--	8 17	9 19	--	--	--	--	--	--	--	--	--	--	--	14 29
Honey locust	--	--	--	7 14	8 16	8 17	--	--	--	--	--	--	--	--	--	--	--	13 26
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42 68
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42 68
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10 21
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14 29
Russian-olive	--	--	--	6 12	6 13	6 14	--	--	--	--	--	--	--	--	--	--	--	10 21
Siberian elm	--	--	--	9 15	10 17	11 18	--	--	--	--	--	--	--	--	--	--	--	17 28
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42 68

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Shrubs:																		
American plum	--	--	--	--	--	--	3	7	3	7	--	--	--	--	--	--	5	11
Bladder senna	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Bush-type rose	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Common lilac	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
European sage	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Four-wing saltbush	2	4	2	4	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Golden currant	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Honeysuckle	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Rabbitbrush	1	3	2	4	2	4	2	4	2	4	--	--	--	--	--	--	3	7
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	8
Siberian peashrub	--	--	--	--	3	6	4	7	4	7	--	--	--	--	--	--	6	11
Silver buffaloberry	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Skunkbush sumac	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 3
 (Loamy)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and are moderately well or well drained; also included are moderately well or well drained clayey soils with a loamy surface mantle greater than 20 inches. Available water capacity (AWC) to 60" is greater than 7.5. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	---	---	---	---	---	7	16	8	17	---	---	---	---	---	---	---	12	26
Austrian pine	---	---	---	---	---	10	20	10	21	---	---	---	---	---	---	---	16	33
Blue spruce	---	---	---	---	---	11	21	12	23	---	---	---	---	---	---	---	18	35
Douglas-fir	---	---	---	---	---	11	22	12	23	---	---	---	---	---	---	---	18	36
Eastern redcedar	---	---	---	---	7	14	7	16	8	17	---	---	---	---	---	---	12	26
Giant sequoia	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14	29
Jeffrey Pine	---	---	---	---	---	9	19	10	21	---	---	---	---	---	---	---	15	32
Lodgepole pine	---	---	---	---	---	9	19	10	21	---	---	---	---	---	---	---	15	32
Northern whitecedar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	12	26
Norway spruce	---	---	---	---	---	11	21	12	23	---	---	---	---	---	---	---	18	35
Ponderosa pine	---	---	---	---	---	9	19	10	21	---	---	---	---	---	---	---	15	32
Rocky Mountain Juniper	---	---	---	---	7	14	7	16	8	17	---	---	---	---	---	---	12	26
Scotch pine	---	---	---	---	---	9	19	10	21	---	---	---	---	---	---	---	15	32
Singleleaf pinyon	---	---	---	---	6	13	6	14	6	16	---	---	---	---	---	---	10	24
Southwestern pinyon	---	---	---	---	7	15	8	17	8	18	---	---	---	---	---	---	13	28
Utah juniper	---	---	---	---	6	13	6	14	6	16	---	---	---	---	---	---	10	24
<u>Deciduous Trees:</u>																		
Black locust	---	---	---	---	---	8	18	9	20	---	---	---	---	---	---	---	14	30
Bolleana poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	35	70
Chinese elm	---	---	---	---	12	26	13	29	14	31	---	---	---	---	---	---	22	48
Fremont cottonwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	24	53
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	19	37

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Green ash	---	---	---	---	---	---	11	22	12	24	---	---	---	---	---	---	19	37
Hackberry	---	---	---	---	---	---	11	22	12	24	---	---	---	---	---	---	19	37
Honey locust	---	---	---	---	---	9	18	10	20	10	21	---	---	---	---	---	16	33
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	55	88
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	55	88
Manchurian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	13	28
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	19	37
Russian-olive	---	---	---	---	7	15	8	17	8	18	---	---	---	---	---	---	13	28
Siberian crabapple	---	---	---	---	---	---	7	17	8	18	---	---	---	---	---	---	13	28
Siberian elm	---	---	---	---	12	28	13	30	14	32	---	---	---	---	---	---	22	50
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	55	88
Shrubs:																		
American plum	---	---	---	---	---	---	4	8	5	9	---	---	---	---	---	---	7	14
Amur privet	---	---	---	---	---	---	5	7	5	8	---	---	---	---	---	---	8	12
Antelope bitterbrush	---	---	4	5	4	6	4	6	5	6	---	---	---	---	---	---	7	10
Big sagebrush	---	---	3	4	3	4	4	5	4	5	---	---	---	---	---	---	6	8
Bladder senna	---	---	---	---	4	6	4	6	5	6	---	---	---	---	---	---	7	10
Bush-type rose	---	---	---	---	---	---	4	6	5	6	---	---	---	---	---	---	7	10
Common chokecherry	---	---	---	---	4	7	5	7	5	8	---	---	---	---	---	---	8	12
Common lilac	---	---	---	---	4	7	5	7	5	8	---	---	---	---	---	---	8	12
Euonymus	---	---	---	---	4	6	4	6	5	6	---	---	---	---	---	---	7	10
European sage	---	---	---	---	3	4	4	5	4	5	---	---	---	---	---	---	6	8
Four-wing saltbush	3	5	3	5	3	6	4	6	4	6	---	---	---	---	---	---	6	10
Golden currant	---	---	---	---	4	7	5	7	5	8	---	---	---	---	---	---	8	12
Honeysuckle	---	---	---	---	4	7	5	7	5	8	---	---	---	---	---	---	8	12
Nanking cherry	---	---	---	---	---	---	5	7	5	8	---	---	---	---	---	---	8	12
Peking cotoneaster	---	---	---	---	---	---	5	7	5	8	---	---	---	---	---	---	8	12
Rabbitbrush	2	4	2	4	2	5	2	5	3	5	---	---	---	---	---	---	4	9
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	7	10
Sandcherry	---	---	---	---	3	6	4	6	4	6	---	---	---	---	---	---	6	10
Siberian peashrub	---	---	---	---	4	8	5	8	5	9	---	---	---	---	---	---	8	14
Silver buffaloberry	---	---	---	---	---	---	5	8	5	8	---	---	---	---	---	---	8	12
Skunkbush sumac	---	---	---	---	4	7	5	7	5	8	---	---	---	---	---	---	8	12

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 4
 (Clayey, Favorable)

Description and Limitations: Soils in this group are deep to very deep, clayey and clayey-skeletal with an 8 to 20 inch loamy surface mantle, or loamy or loamy-skeletal with greater than 35% clay content; and are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils with surface layers having greater than 35% rock fragments.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	---	---	---	---	5	11	6	12	---	---	---	---	---	---	---	---	9	19
Austrian pine	---	---	---	---	7	14	8	16	---	---	---	---	---	---	---	---	12	24
Blue spruce	---	---	---	---	8	16	8	17	---	---	---	---	---	---	---	---	13	26
Douglas-fir	---	---	---	---	8	16	8	17	---	---	---	---	---	---	---	---	13	26
Eastern redcedar	---	---	---	5	10	5	11	6	12	---	---	---	---	---	---	---	9	19
Giant sequoia	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	10	21
Jeffrey Pine	---	---	---	---	7	14	7	15	---	---	---	---	---	---	---	---	11	23
Lodgepole pine	---	---	---	---	7	14	7	15	---	---	---	---	---	---	---	---	11	23
Northern whitcedar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	9	19
Norway spruce	---	---	---	---	8	16	8	17	---	---	---	---	---	---	---	---	13	26
Ponderosa pine	---	---	---	---	7	14	7	15	---	---	---	---	---	---	---	---	11	23
Rocky Mountain Juniper	---	---	---	5	10	5	11	6	12	---	---	---	---	---	---	---	9	19
Scotch pine	---	---	---	---	7	14	7	15	---	---	---	---	---	---	---	---	11	23
Singleleaf pinyon	---	---	---	4	10	4	11	5	12	---	---	---	---	---	---	---	7	18
Southwestern pinyon	---	---	---	4	10	4	11	5	12	---	---	---	---	---	---	---	7	18
<u>Deciduous Trees:</u>																		
Black locust	---	---	---	---	6	13	6	14	---	---	---	---	---	---	---	---	10	22
Bolleana poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	26	51
Chinese elm	---	---	---	9	19	10	21	10	23	---	---	---	---	---	---	---	16	35
Fremont cottonwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	18	38

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	27
Green ash	--	--	--	--	--	--	8	16	9	18	--	--	--	--	--	--	14	27
Hackberry	--	--	--	--	--	--	8	16	9	18	--	--	--	--	--	--	14	27
Honey locust	--	--	--	--	7	13	7	14	8	16	--	--	--	--	--	--	12	24
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	20
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	27
Russian-olive	--	--	--	--	6	11	6	12	6	13	--	--	--	--	--	--	10	20
Siberian crabapple	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Siberian elm	--	--	--	--	9	20	10	22	10	23	--	--	--	--	--	--	16	36
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
<u>Shrubs:</u>																		
American plum	--	--	--	--	--	--	3	6	3	6	--	--	--	--	--	--	5	10
Amur privet	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Antelope bitterbrush	--	--	2	4	3	4	3	4	3	5	--	--	--	--	--	--	5	7
Big sagebrush	--	--	2	3	2	3	2	3	3	3	--	--	--	--	--	--	4	6
Bladder senna	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	--	5	7
Bush-type rose	--	--	--	--	--	--	3	4	3	5	--	--	--	--	--	--	5	7
Common chokecherry	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Common lilac	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Euonymus	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	--	5	7
European sage	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Four-wing saltbush	2	3	2	4	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Golden currant	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Honeysuckle	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Nanking cherry	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Peking cotoneaster	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	7
Sandcherry	--	--	--	--	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	4	6	4	6	--	--	--	--	--	--	6	10
Silver buffaloberry	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Skunkbush sumac	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 4C
 (Clayey)

Description and Limitations: Soils in this group have a fine earth fraction that is greater than 35% clay throughout. Soils with loamy surface layers less than 8 inches thick over clayey or clayey-skeletal layers are also included. They are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. High clay content affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils with surface layers having greater than 35% rock fragments. Because of high clay content, extra care will be needed to make sure soil around roots is firmly packed after planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Blue spruce	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Eastern redcedar	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Lodgepole pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	22
Norway spruce	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Ponderosa pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	22
Rocky Mountain Juniper	--	--	--	--	5	10	5	11	6	12	--	--	--	--	--	--	9	18
Scotch pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	22
Utah juniper	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Balleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	48
Chinese elm	--	--	--	--	8	18	9	20	10	21	--	--	--	--	--	--	15	33
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	36
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	26
Green ash	--	--	--	--	--	--	8	16	8	17	--	--	--	--	--	--	13	26
Hackberry	--	--	--	--	--	--	8	16	8	17	--	--	--	--	--	--	13	26
Honey locust	--	--	--	--	6	12	7	13	7	14	--	--	--	--	--	--	11	22

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	26
Russian-olive	--	--	--	5	10	5	11	6	12	--	--	--	--	--	--	--	9	19
Siberian crabapple	--	--	--	--	--	5	11	6	12	--	--	--	--	--	--	--	9	19
Siberian elm	--	--	--	8	19	9	20	10	22	--	--	--	--	--	--	--	15	34

Shrubs:

Amur privet	--	--	--	3	5	3	5	--	--	--	--	--	--	--	--	5	8
Antelope bitterbrush	--	2	4	2	4	2	4	2	5	--	--	--	--	--	--	4	7
Big sagebrush	--	2	2	2	3	2	3	2	3	--	--	--	--	--	--	4	5
Bladder senna	--	--	--	2	4	2	4	2	5	--	--	--	--	--	--	4	7
Bush-type rose	--	--	--	--	--	2	4	2	5	--	--	--	--	--	--	4	7
Common chokecherry	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Common lilac	--	--	--	3	5	3	5	3	5	--	--	--	--	--	--	5	8
Euonymus	--	--	--	2	4	2	4	2	5	--	--	--	--	--	--	4	7
European sage	--	--	--	2	3	2	3	2	3	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	4	2	4	2	4	2	5	--	--	--	--	--	4	7
Golden currant	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Honeysuckle	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Nanking cherry	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Peking cotoneaster	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	3	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	7
Sandcherry	--	--	--	2	4	2	4	2	5	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	3	6	3	6	3	6	--	--	--	--	--	--	5	10
Silver buffaloberry	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Skunkbush sumac	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 5
 (Droughty)

Description and Limitations: Soils in this group are deep to very deep, and loamy and loamy-skeletal with moderate and moderately high available water capacities (AWC to 60" is 3.75 to 7.5"). They are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	10 20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	5 11	6 12	--	--	--	--	--	--	--	--	--	--	9 19	
Austrian pine	--	--	--	--	7 14	8 16	--	--	--	--	--	--	--	--	--	--	12 24	
Blue spruce	--	--	--	--	8 16	8 17	--	--	--	--	--	--	--	--	--	--	13 26	
Douglas-fir	--	--	--	--	8 16	8 17	--	--	--	--	--	--	--	--	--	--	13 26	
Eastern redcedar	--	--	--	5 10	5 11	6 12	--	--	--	--	--	--	--	--	--	--	9 19	
Giant sequoia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10 21	
Jeffrey Pine	--	--	--	--	7 14	7 15	--	--	--	--	--	--	--	--	--	--	11 23	
Lodgepole pine	--	--	--	--	7 14	7 15	--	--	--	--	--	--	--	--	--	--	11 23	
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9 19	
Norway spruce	--	--	--	--	8 16	8 17	--	--	--	--	--	--	--	--	--	--	13 26	
Ponderosa pine	--	--	--	--	7 14	7 15	--	--	--	--	--	--	--	--	--	--	11 23	
Rocky Mountain Juniper	--	--	--	5 10	5 11	6 12	--	--	--	--	--	--	--	--	--	--	9 19	
Scotch pine	--	--	--	--	7 14	7 15	--	--	--	--	--	--	--	--	--	--	11 23	
Singleleaf pinyon	--	--	--	4 10	4 11	5 12	--	--	--	--	--	--	--	--	--	--	7 18	
Southwestern pinyon	--	--	--	6 11	6 12	6 13	--	--	--	--	--	--	--	--	--	--	10 20	
Utah juniper	--	--	--	4 10	4 11	5 12	--	--	--	--	--	--	--	--	--	--	7 18	
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	6 13	6 14	--	--	--	--	--	--	--	--	--	--	10 22	
Boyleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	26 51	
Chinese elm	--	--	--	9 19	10 21	10 23	--	--	--	--	--	--	--	--	--	--	16 35	
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18 38	

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	27
Green ash	--	--	--	--	--	--	8	16	9	18	--	--	--	--	--	--	14	27
Hackberry	--	--	--	--	--	--	8	16	9	18	--	--	--	--	--	--	14	27
Honey locust	--	--	--	--	7	13	7	14	8	16	--	--	--	--	--	--	12	24
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	20
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	27
Russian-olive	--	--	--	--	6	11	6	13	6	14	--	--	--	--	--	--	10	20
Siberian crabapple	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	20
Siberian elm	--	--	--	--	9	20	10	22	10	23	--	--	--	--	--	--	16	36
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
<u>Shrubs:</u>																		
American plum	--	--	--	--	--	--	3	6	3	6	--	--	--	--	--	--	5	10
Amur privet	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Antelope bitterbrush	--	--	2	4	3	4	3	4	3	5	--	--	--	--	--	--	5	7
Big sagebrush	--	--	2	3	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Bladder senna	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	--	5	7
Bush-type rose	--	--	--	--	--	--	3	4	3	5	--	--	--	--	--	--	5	7
Common chokecherry	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Common lilac	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Euonymus	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	--	5	7
European sage	--	--	--	--	2	4	2	4	2	5	--	--	--	--	--	--	4	6
Four-wing saltbush	2	3	2	4	2	4	2	4	2	5	--	--	--	--	--	--	4	7
Golden currant	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Honeysuckle	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Nanking cherry	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Peking cotoneaster	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	7
Sandcherry	--	--	--	--	2	4	2	4	2	5	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	4	6	4	6	--	--	--	--	--	--	6	10
Silver buffaloberry	--	--	--	--	--	--	4	5	4	6	--	--	--	--	--	--	6	9
Skunkbush sumac	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 5K
 (Droughty, Carbonates)

Description and Limitations: Soils in this group are deep to very deep, loamy and loamy-skeletal with moderate and moderately high available water capacities (AWC to 60" is 3.75 to 7.5"). They are somewhat poorly, moderately well or well drained. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	5	11	5	12	--	--	--	--	--	--	--	--	8	18
Blue spruce	--	--	--	--	7	14	8	16	--	--	--	--	--	--	--	--	12	24
Eastern redcedar	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Rocky Mountain Juniper	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Utah juniper	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	20
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	48
Chinese elm	--	--	--	--	8	18	9	20	10	21	--	--	--	--	--	--	15	33
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	36
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	26
Green ash	--	--	--	--	8	16	8	17	--	--	--	--	--	--	--	--	13	26
Hackberry	--	--	--	--	8	16	8	17	--	--	--	--	--	--	--	--	13	26
Honey locust	--	--	--	--	6	12	7	13	7	14	--	--	--	--	--	--	11	22
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	19
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	26

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Russian-olive	--	--	--	--	5	10	5	11	6	12	--	--	--	--	--	--	9	19
Siberian elm	--	--	--	--	8	19	9	20	10	22	--	--	--	--	--	--	15	34
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Shrubs:																		
American plum	--	--	--	--	--	--	2	6	3	6	--	--	--	--	--	--	4	10
Bladder senna	--	--	--	--	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Bush-type rose	--	--	--	--	--	--	2	4	3	5	--	--	--	--	--	--	4	7
Common lilac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Euonymus	--	--	--	--	2	4	2	4	3	5	--	--	--	--	--	--	4	7
European sage	--	--	--	--	2	3	2	3	3	3	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	4	2	4	2	4	3	5	--	--	--	--	--	--	4	7
Golden currant	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Honeysuckle	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	3	6	3	6	--	--	--	--	--	--	5	10
Silver buffaloberry	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Skunkbush sumac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6
 (Very Droughty)

Description and Limitations: Soils in this group are moderately deep to very deep; have loamy, loamy-skeletal, sandy, or sandy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 2.0 to 3.75" (can be less than 2.0" AWC if an irrigated phase of a soil). In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low AWC affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	--	--	5	10	5	11	--	--	--	--	--	--	8	17
Austrian pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Blue spruce	--	--	--	--	--	--	6	13	7	14	--	--	--	--	--	--	11	22
Douglas-fir	--	--	--	--	--	--	6	13	7	14	--	--	--	--	--	--	11	22
Eastern redcedar	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	17
Giant sequoia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	18
Jeffrey Pine	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Lodgepole pine	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	17
Norway spruce	--	--	--	--	--	--	6	13	7	14	--	--	--	--	--	--	11	22
Ponderosa pine	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Rocky Mountain Juniper	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	17
Scotch pine	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Singleleaf pinyon	--	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	6	15
Southwestern pinyon	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	18
Utah juniper	--	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	6	15
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	5	11	6	12	--	--	--	--	--	--	9	19
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	45

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Chinese elm	--	--	--	--	8	17	8	19	9	20	--	--	--	--	--	--	14	31
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	34
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24
Green ash	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Hackberry	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Honey locust	--	--	--	--	7	12	7	13	8	14	--	--	--	--	--	--	10	21
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24
Russian-olive	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Siberian crabapple	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Siberian elm	--	--	--	--	8	17	8	19	9	20	--	--	--	--	--	--	14	31
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
<u>Shrubs:</u>																		
Amur privet	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Antelope bitterbrush	--	--	2	3	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Big sagebrush	--	--	2	2	2	3	2	3	3	3	--	--	--	--	--	--	4	5
Bladder senna	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Bush-type rose	--	--	--	--	--	--	2	4	3	4	--	--	--	--	--	--	4	6
Common chokecherry	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Common lilac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Euonymus	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
European sage	--	--	--	--	2	3	2	3	3	3	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	3	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Golden currant	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Honeysuckle	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8
Nanking cherry	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Peking cotoneaster	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	--	3	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6
Sandcherry	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Siberian peashrub	--	--	--	--	3	5	3	5	3	6	--	--	--	--	--	--	5	9
Silver buffaloberry	--	--	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Skunkbush sumac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	--	5	8

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 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6K
 (Very Droughty, Carbonates)

Description and Limitations: Soils in this group are moderately deep to very deep; have loamy, loamy-skeletal, sandy, or sandy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 2.0 to 3.75" (can be less than 2.0" AWC if in an irrigated subgroup). In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. A low AWC and free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	--	--	4	10	5	10	--	--	--	--	--	--	7	16
Eastern redcedar	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
Northern whitcedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7	16
Rocky Mountain Juniper	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
Utah juniper	--	--	--	--	3	8	4	8	4	9	--	--	--	--	--	--	6	14
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Chinese elm	--	--	--	--	7	15	8	17	8	18	--	--	--	--	--	--	13	28
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	31
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	22
Green ash	--	--	--	--	--	--	7	13	7	14	--	--	--	--	--	--	11	22
Hackberry	--	--	--	--	--	--	7	13	7	14	--	--	--	--	--	--	11	22
Honey locust	--	--	--	--	6	11	6	12	6	13	--	--	--	--	--	--	10	20
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	52
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	52
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	16
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	22
Russian-olive	--	--	--	--	4	9	5	10	5	10	--	--	--	--	--	--	8	16

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Siberian elm	--	--	--	--	7	16	8	17	8	19	--	--	--	--	--	13	29	
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	52	
<u>Shrubs:</u>																		
Bladder senna	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	4	6	
Bush-type rose	--	--	--	--	--	--	2	4	3	4	--	--	--	--	--	4	6	
Common lilac	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	5	7	
Euonymus	--	--	--	--	3	3	3	4	3	4	--	--	--	--	--	4	6	
European sage	--	--	--	--	2	3	2	3	2	3	--	--	--	--	--	3	5	
Four-wing saltbush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	--	3	6	
Golden currant	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	5	7	
Honeysuckle	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	5	7	
Rabbitbrush	1	2	2	2	2	3	2	3	2	3	--	--	--	--	--	3	5	
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6	
Siberian peashrub	--	--	--	--	3	4	3	5	3	5	--	--	--	--	--	5	8	
Silver buffaloberry	--	--	--	--	--	--	3	4	3	5	--	--	--	--	--	5	7	
Skunkbush sumac	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	5	7	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6R
 (Moderately Deep, Favorable)

Description and Limitations: Soils in this group are moderately deep; have loamy, clayey-skeletal, or loamy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 3.75" or greater. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low to moderately high AWC affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume).

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Evergreen Trees:

Arizona cypress	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Blue spruce	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Douglas-fir	--	--	--	--	--	--	7	15	8	16	--	--	--	--	--	--	12	25
Eastern redcedar	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Giant sequoia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	20
Jeffrey Pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	22
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Norway spruce	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Ponderosa pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	22
Rocky Mountain Juniper	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Singleleaf pinyon	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16
Southwestern pinyon	--	--	--	--	5	10	5	11	5	12	--	--	--	--	--	--	9	19
Utah juniper	--	--	--	--	4	9	4	10	5	10	--	--	--	--	--	--	7	16

Deciduous Trees:

Black locust	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Bolleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	48
Chinese elm	--	--	--	--	8	18	9	20	10	21	--	--	--	--	--	--	15	33
Freemont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	36
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	26

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Green ash	--	--	--	--	--	--	8	16	8	17	--	--	--	--	--	--	13	26
Hackberry	--	--	--	--	--	--	8	16	8	17	--	--	--	--	--	--	13	26
Honey locust	--	--	--	--	6	12	7	13	7	14	--	--	--	--	--	--	11	22
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	19
Russian-olive	--	--	--	--	5	10	5	11	6	12	--	--	--	--	--	--	9	19
Siberian crabapple	--	--	--	--	--	--	5	11	6	12	--	--	--	--	--	--	9	19
Siberian elm	--	--	--	--	8	19	9	20	10	22	--	--	--	--	--	--	15	34
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60

Shrubs:

American plum	--	--	--	--	2	6	3	6	--	--	--	--	--	--	4	10
Amur privet	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Antelope bitterbrush	--	--	2	4	2	4	2	4	3	5	--	--	--	--	4	7
Big sagebrush	--	--	2	2	2	3	2	3	3	3	--	--	--	--	4	5
Bladder senna	--	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7
Bush-type rose	--	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7
Common chokecherry	--	--	--	--	3	4	3	5	3	5	--	--	--	--	5	8
Common lilac	--	--	--	--	3	4	3	5	3	5	--	--	--	--	5	8
Euonymus	--	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7
European sage	--	--	--	--	2	3	2	3	3	3	--	--	--	--	4	5
Four-wing saltbush	2	3	2	4	2	4	2	4	3	5	--	--	--	--	4	7
Golden currant	--	--	--	--	3	4	3	5	3	5	--	--	--	--	5	8
Honeysuckle	--	--	--	--	3	4	3	5	3	5	--	--	--	--	5	8
Nanking cherry	--	--	--	--	3	5	3	5	3	5	--	--	--	--	5	8
Peking cotoneaster	--	--	--	--	3	5	3	5	3	5	--	--	--	--	5	8
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	--	--	--	--	3	6
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	7
Sandcherry	--	--	--	--	2	4	2	4	3	5	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	3	6	3	6	--	--	--	--	5	10
Silver buffaloberry	--	--	--	--	3	4	3	5	3	5	--	--	--	--	5	8
Skunkbush sumac	--	--	--	--	3	4	3	4	3	5	--	--	--	--	5	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:

A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP GRK
 (Moderately Deep, Carbonates)

Description and Limitations: Soils in this group are moderately deep; have loamy, clayey-skeletal, or loamy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 3.75" or greater. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. A low to moderately high AWC and free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume).

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	--	--	5	10	5	11	--	--	--	--	--	--	8	17
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	5	11	6	12	--	--	--	--	--	--	9	19
Chinese elm	--	--	--	--	8	17	8	19	9	20	--	--	--	--	--	--	14	31
Honey locust	--	--	--	--	6	12	6	13	6	14	--	--	--	--	--	--	10	21
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Russian-olive	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Siberian elm	--	--	--	--	8	17	8	19	9	20	--	--	--	--	--	--	14	31
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	2	4	3	4	3	4	--	--	--	--	--	--	4	6
Euonymus	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
European sage	--	--	--	--	2	3	2	3	3	3	--	--	--	--	--	--	4	5

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Four-wing saltbush	2	3	2	3	2	3	2	4	2	4	---	---	---	---	---	4	6	
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	---	---	---	---	---	3	6	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 7
 (Sandy)

Description and Limitations: Soils in this group are deep to very deep and sandy throughout (includes arenic and gross arenic soil subgroups) and are moderately well, well somewhat excessive, or excessive drained. Available water capacity (AWC) to 60" is greater than 2.0. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low to moderate available water capacity affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Soil blowing at or near the planting site can adversely affect the health and vigor of developing windbreaks. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	--	--	5	10	5	11	--	--	--	--	--	--	8	17
Austrian pine	--	--	--	--	--	--	6	13	6	14	--	--	--	--	--	--	10	21
Blue spruce	--	--	--	--	--	--	7	13	7	14	--	--	--	--	--	--	11	22
Douglas-fir	--	--	--	--	--	--	7	14	7	15	--	--	--	--	--	--	11	23
Eastern redcedar	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	17
Giant sequoia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	18
Jeffrey Pine	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Lodgepole pine	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Northern whitcedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	17
Ponderosa pine	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Rocky Mountain Juniper	--	--	--	--	4	9	5	10	5	11	--	--	--	--	--	--	8	17
Scotch pine	--	--	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Singleleaf pinyon	--	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	6	15
Southwestern pinyon	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Utah juniper	--	--	--	--	3	8	4	9	4	10	--	--	--	--	--	--	6	15
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	5	11	6	12	--	--	--	--	--	--	9	19
Balleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	45
Chinese elm	--	--	--	--	8	17	8	19	9	20	--	--	--	--	--	--	14	31
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	34

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24
Green ash	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Hackberry	--	--	--	--	--	--	7	14	8	16	--	--	--	--	--	--	12	24
Honey locust	--	--	--	--	6	12	6	13	6	14	--	--	--	--	--	--	10	21
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24
Russian-olive	--	--	--	--	4	10	5	11	5	12	--	--	--	--	--	--	8	18
Siberian crabapple	--	--	--	--	--	--	5	11	5	12	--	--	--	--	--	--	8	18
Siberian elm	--	--	--	--	8	17	8	19	9	20	--	--	--	--	--	--	14	31
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56

Shrubs:

American plum	--	--	--	--	2	5	3	6	--	--	--	--	--	--	4	9
Amur privet	--	--	--	--	3	5	3	5	--	--	--	--	--	--	5	8
Antelope bitterbrush	--	2	3	2	3	2	4	3	4	--	--	--	--	4	6	
Big sagebrush	--	2	2	2	3	2	3	3	3	--	--	--	--	4	5	
Bladder senna	--	--	2	3	2	4	3	4	--	--	--	--	4	6		
Bush-type rose	--	--	--	--	2	4	3	4	--	--	--	--	4	6		
Common chokecherry	--	--	3	4	3	5	3	5	--	--	--	--	5	8		
Common lilac	--	--	3	4	3	5	3	5	--	--	--	--	5	8		
Euonymus	--	--	2	3	2	4	3	4	--	--	--	--	4	6		
European sage	--	--	2	3	2	3	3	4	--	--	--	--	4	5		
Four-wing saltbush	2	3	2	3	2	3	2	4	3	4	--	--	4	6		
Golden currant	--	--	3	4	3	5	3	5	--	--	--	--	5	8		
Honeysuckle	--	--	3	4	3	5	3	5	--	--	--	--	5	8		
Nanking cherry	--	--	--	--	3	5	3	5	--	--	--	--	5	8		
Peking cotoneaster	--	--	--	--	3	5	3	5	--	--	--	--	5	8		
Rabbitbrush	1	3	2	3	2	3	2	4	2	4	--	--	3	6		
Redosier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	4	6		
Sandcherry	--	--	2	3	2	4	3	4	--	--	--	--	4	6		
Siberian peashrub	--	--	3	5	3	5	3	6	--	--	--	--	5	9		
Silver buffaloberry	--	--	--	--	3	5	3	5	--	--	--	--	5	8		
Skunkbush sumac	--	--	3	4	3	5	3	5	--	--	--	--	5	8		

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 8
 (Loamy, Carbonates)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and are moderately well or well drained; also included are clayey soils with a loamy surface mantle greater than 20 inches. Available water capacity (AWC) to 60" is greater than 7.5. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	--	--	7	14	7	16	--	--	--	--	--	--	11	24
Blue spruce	--	--	--	--	--	--	10	19	10	21	--	--	--	--	--	--	16	32
Eastern redcedar	--	--	--	--	6	13	7	14	7	16	--	--	--	--	--	--	11	24
Northern whitecedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	24
Ponderosa pine	--	--	--	--	--	--	8	17	9	19	--	--	--	--	--	--	14	29
Rocky Mountain Juniper	--	--	--	--	6	13	7	14	7	16	--	--	--	--	--	--	11	24
Utah juniper	--	--	--	--	5	12	5	13	6	14	--	--	--	--	--	--	9	22
<u>Deciduous Trees:</u>																		
Black locust	--	--	--	--	--	--	8	16	8	18	--	--	--	--	--	--	13	27
Belleana poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	64
Chinese elm	--	--	--	--	11	24	12	26	13	29	--	--	--	--	--	--	20	44
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	48
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	34
Green ash	--	--	--	--	--	--	10	20	11	22	--	--	--	--	--	--	17	34
Hackberry	--	--	--	--	--	--	10	20	11	22	--	--	--	--	--	--	17	34
Honey locust	--	--	--	--	8	16	9	18	10	20	--	--	--	--	--	--	15	30
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
Manchurian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	25
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	34

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Russian-olive	--	--	--	--	7	14	7	15	8	16	--	--	--	--	--	--	12	25
Siberian elm	--	--	--	--	11	25	12	27	13	29	--	--	--	--	--	--	20	45
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
Shrubs:																		
American plum	--	--	--	--	4	8	4	8	4	8	--	--	--	--	--	--	6	13
Bladder senna	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
Bush-type rose	--	--	--	--	4	5	4	5	4	6	--	--	--	--	--	--	6	9
Common lilac	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Euonymus	--	--	--	--	3	5	4	5	4	6	--	--	--	--	--	--	6	9
European sage	--	--	--	--	3	4	3	4	3	5	--	--	--	--	--	--	5	7
Four-wing saltbush	2	4	2	4	3	5	3	5	3	6	--	--	--	--	--	--	5	9
Golden currant	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Honeysuckle	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11
Rabbitbrush	2	4	2	4	2	4	2	5	3	5	--	--	--	--	--	--	4	8
Redesier dogwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	9
Siberian peashrub	--	--	--	--	4	7	4	8	5	8	--	--	--	--	--	--	7	13
Silver buffaloberry	--	--	--	--	4	7	4	7	5	7	--	--	--	--	--	--	7	11
Skunkbush sumac	--	--	--	--	4	6	4	7	5	7	--	--	--	--	--	--	7	11

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 96
 (Wet, Saline, Alkaline)

Description and Limitations: Soils in this group are moderately deep to very deep with a water table at 18 to 60" from the surface; some are subject to flooding or ponding. They are poorly, somewhat poorly, or moderately well drained (including artificially drained). In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume). Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Evergreen Trees:

None

Deciduous Trees:

Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	29
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	20
Green ash	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Hackberry	--	--	--	--	6	12	6	13	--	--	--	--	--	--	10	20
Russian-olive	--	--	4	8	4	9	5	10	--	--	--	--	--	--	7	15

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Shrubs

Four-wing saltbush	1	2	2	2	2	3	2	3	2	3	---	---	---	---	---	3	5
Rabbitbrush	1	2	1	2	1	3	1	3	1	3	---	---	---	---	---	2	5

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 9N
 (Dry, Saline, Alkaline)

Description and Limitations: Soils in this group are clayey, moderately deep to very deep, do not have a water table within 5 feet of the surface and are not subject to flooding or ponding. In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Because of high clay content, extra care will be needed to make sure soil around roots is firmly packed after planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	--	--	4	7	4	8	--	--	--	--	--	--	6	12
<u>Deciduous Trees:</u>																		
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	24
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	17
Green ash	--	--	--	--	--	--	5	10	5	11	--	--	--	--	--	--	8	17
<u>Shrubs:</u>																		
Bladder senna	--	--	--	--	2	2	2	2	2	3	--	--	--	--	--	--	3	4
Four-wing saltbush	1	2	1	2	1	2	1	2	1	3	--	--	--	--	--	--	2	4
Honeysuckle	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Rabbitbrush	1	2	1	2	1	2	1	2	1	3	--	--	--	--	--	--	2	4

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Siberian peashrub	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Silver buffaloberry	--	--	--	--	--	--	2	4	3	4	--	--	--	--	--	--	4	6

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 9ML
 (Dry, Saline, Alkaline, Favorable)

Description and Limitations: Soils in this group are loamy or loamy over clayey, moderately deep to very deep, do not have a water table within 5 feet of the surface and are not subject to flooding or ponding. In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	--	--	4	8	4	8	--	--	--	--	--	--	6	13
<u>Deciduous Trees:</u>																		
Fremont cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	26
Golden willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	19
Green ash	--	--	--	--	5	11	6	12	--	--	--	--	--	--	--	--	9	19
Russian-olive	--	--	--	--	4	8	4	8	5	9	--	--	--	--	--	--	7	14
<u>Shrubs:</u>																		
Bladder senna	--	--	--	--	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Four-wing saltbush	1	2	2	2	2	3	2	3	2	3	--	--	--	--	--	--	3	5
Honeysuckle	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	--	4	6
Rabbitbrush	1	2	1	2	1	2	1	2	1	3	--	--	--	--	--	--	2	4

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Siberian peashrub	--	--	--	--	2	3	2	4	3	4	--	--	--	--	--	4	6	
Silver buffaloberry	--	--	--	--	--	--	2	4	3	4	--	--	--	--	--	4	6	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 10
(Unsuited)

Description and Limitations: Soils in this group have one or more characteristics such as soils depth, texture, drainage, available water capacity, or salts which severely limit planting, survival, or growth of trees and shrubs. Examples include very shallow and shallow soils, soils with a very low available water capacity (AWC is less than 2"), very poorly and poorly drained soils that are saturated or ponded throughout the growing season, and toxic salts. Soils in this group are not recommended for farmstead, feedlot or field windbreaks. However, onsite investigation may reveal that tree and shrub plantings can be made with special treatments such as irrigation and leaching of salts. The selection of species must then be tailored to the soil conditions existing at the altered site.

WINDBREAK SOIL GROUP 1
(Wet, Favorable)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and subject to frequent flooding, run in, or a seasonal high water table. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Evergreen Trees:

Allepo pine	---	---	---	8	17	---	---	---	---	---	---	---	---	---	---	---	---	14	29
Arizona cypress	---	---	---	8	17	---	---	---	---	---	---	---	---	---	---	---	---	14	29
Athel	---	---	7	13	7	14	---	---	---	---	---	---	---	---	---	---	---	12	24
Bluegum eucalyptus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	42	84
Eldarica pine	---	---	8	16	8	17	---	---	---	---	---	---	---	---	---	---	---	14	29
Italian cypress	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14	29
Redgum eucalyptus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	36	78

Deciduous Trees:

Arizona ash	---	---	---	10	20	---	---	---	---	---	---	---	---	---	---	---	---	17	34
Black locust	---	---	9	19	10	20	---	---	---	---	---	---	---	---	---	---	---	17	34
Honey locust	---	---	10	20	11	22	---	---	---	---	---	---	---	---	---	---	---	18	36
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	60	96
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	60	96
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20	41
Russian-olive	---	---	8	16	8	18	---	---	---	---	---	---	---	---	---	---	---	14	30
Siberian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14	30
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	60	96

Shrubs:

Bush-type rose	---	---	---	4	7	---	---	---	---	---	---	---	---	---	---	---	---	7	11
Desertwillow	---	---	---	4	7	---	---	---	---	---	---	---	---	---	---	---	---	7	11
Euonymus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	7	11

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
European sage	--	--	--	--	--	--	4	5	--	--	--	--	--	--	--	--	6	8
Fourwing saltbush	3	5	3	6	3	6	4	7	--	--	--	--	--	--	--	--	6	11
Mesquite	--	--	--	--	--	--	4	8	--	--	--	--	--	--	--	--	7	14
Nanking cherry	--	--	--	--	--	--	5	8	--	--	--	--	--	--	--	--	8	13
Oleander	--	--	--	--	--	--	5	8	--	--	--	--	--	--	--	--	8	14
Quailbush	--	--	4	6	4	6	4	7	--	--	--	--	--	--	--	--	7	11
Siberian peashrub	--	--	--	--	4	9	5	10	--	--	--	--	--	--	--	--	8	16

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 1K
(Net, Favorable, Carbonates)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and subject to frequent flooding, run in, or a seasonal high water table. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, and an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	7	14	--	--	--	--	--	--	--	--	--	--	12	24
Arizona cypress	--	--	--	--	7	14	--	--	--	--	--	--	--	--	--	--	12	24
Athel	--	--	--	--	6	11	6	12	--	--	--	--	--	--	--	--	10	20
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	70
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30	65
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	8	17	--	--	--	--	--	--	--	--	--	--	14	28
Black locust	--	--	--	--	8	15	8	17	--	--	--	--	--	--	--	--	14	28
Honey locust	--	--	--	--	8	11	9	12	--	--	--	--	--	--	--	--	15	20
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	34
Russian-olive	--	--	--	--	7	14	7	15	--	--	--	--	--	--	--	--	12	25
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	4	5	--	--	--	--	--	--	--	--	--	--	6	9
Desertwillow	--	--	--	--	4	5	--	--	--	--	--	--	--	--	--	--	6	9
Euonymus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	9
European sage	--	--	--	--	3	4	--	--	--	--	--	--	--	--	--	--	5	7

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Four-wing saltbush	2	4	2	4	3	5	3	5	---	---	---	---	---	---	---	---	5	9
Mesquite	---	---	---	---	---	---	4	7	---	---	---	---	---	---	---	---	6	12
Oleander	---	---	---	---	---	---	4	7	---	---	---	---	---	---	---	---	7	12
Quailbush	---	---	3	4	3	5	4	5	---	---	---	---	---	---	---	---	6	9
Siberian peashrub	---	---	---	---	4	7	4	8	---	---	---	---	---	---	---	---	7	13

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2
 (Wet, Drained)

Description and Limitations: Soils in this group are artificially drained phases of very-poorly and poorly drained mineral soils. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Degree of wetness and drainage affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this groups. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
<u>Evergreen Trees:</u>																			
Allepo pine	--	--	--	--			7	13	--	--	--	--						11	22
Athel	--	--	--	--	5	10	5	11	--	--	--	--						9	18
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--						32	63
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--						27	58
<u>Deciduous Trees:</u>																			
Arizona ash	--	--	--	--			8	15	--	--	--	--						13	25
Black locust	--	--	--	--	7	14	8	15	--	--	--	--						13	25
Honey locust	--	--	--	--	8	15	8	16	--	--	--	--						14	27
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--						45	72
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--						45	72
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--						15	31
Russian-olive	--	--	--	--	6	12	7	13	--	--	--	--						11	22
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--						11	22
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--						45	72
<u>Shrubs:</u>																			
Bush-type rose	--	--	--	--			3	5	--	--	--	--						5	8
Desertwillow	--	--	--	--			3	5	--	--	--	--						5	8
European sage	--	--	--	--			2	4	--	--	--	--						4	6

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Four-wing saltbush	2	4	2	4	2	4	2	5	---	---	---	---	---	---	---	---	4	8
Nanking cherry	---	---	---	---	---	---	4	6	---	---	---	---	---	---	---	---	6	10
Oleander	---	---	---	---	---	---	4	7	---	---	---	---	---	---	---	---	6	11
Siberian peashrub	---	---	---	---	3	7	4	7	---	---	---	---	---	---	---	---	6	12

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2H
(Wet, Drained, Histosols)

Description and Limitations: Soils in this group are artificially drained and have a muck surface layer greater than 16" thick. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Degree of wetness and drainage and a very high organic matter content affect the selection and growth of tree and shrub species. Limitations to machine planting and hand planting are slight. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	6	12	--	--	--	--	--	--	--	--	--	--	10	20
Athel	--	--	--	--	4	9	5	10	--	--	--	--	--	--	--	--	8	17
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30	60
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	26	55
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	7	14	--	--	--	--	--	--	--	--	--	--	12	24
Black locust	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	12	24
Honey locust	--	--	--	--	7	9	8	10	--	--	--	--	--	--	--	--	13	16
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	68
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	68
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	29
Russian-olive	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	21
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	21
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	68
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	3	5	--	--	--	--	--	--	--	--	--	--	5	8
Desertwillow	--	--	--	--	3	5	--	--	--	--	--	--	--	--	--	--	5	8
European sage	--	--	--	--	2	4	--	--	--	--	--	--	--	--	--	--	4	6
Four-wing saltbush	2	3	2	3	2	3	2	4	--	--	--	--	--	--	--	--	4	6
Nanking cherry	--	--	--	--	4	5	--	--	--	--	--	--	--	--	--	--	6	9

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Oleander	---	---	---	---	4	6	---	---	---	---	---	---	---	---	---	---	6	10
Siberian peashrub	---	---	---	---	2	6	2	7	---	---	---	---	---	---	---	---	6	11

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 2K
 (Wet, Drained, Carbonates)

Description and Limitations: Soils in this group are artificially drained phases of very poorly and poorly drained mineral soils. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Degree of wetness and drainage, free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this groups. Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	6	12	--	--	--	--	--	--	--	--	--	--	10	20
Athel	--	--	--	--	4	9	5	10	--	--	--	--	--	--	--	--	8	17
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30	60
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	26	55
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	7	14	--	--	--	--	--	--	--	--	--	--	12	24
Black locust	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	12	24
Honey locust	--	--	--	--	7	14	8	16	--	--	--	--	--	--	--	--	13	26
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	68
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	68
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	29
Russian-olive	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	21
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	21
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	68
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	3	5	--	--	--	--	--	--	--	--	--	--	5	8
Desertwillow	--	--	--	--	3	5	--	--	--	--	--	--	--	--	--	--	5	8

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
European sage	--	--	--	--	2	4	--	--	--	--	--	--	--	--	--	--	4	6
Four-wing saltbush	2	4	2	4	2	4	2	5	--	--	--	--	--	--	--	--	4	8
Oleander	--	--	--	--	4	6	--	--	--	--	--	--	--	--	--	--	6	10
Siberian peashrub	--	--	--	--	3	6	4	7	--	--	--	--	--	--	--	--	6	11

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 3
(Loamy)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and are moderately well or well drained; also included are moderately well or well drained clayey soils with a loamy surface mantle greater than 20 inches. Available water capacity (AWC) to 60" is greater than 7.5. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
<u>Evergreen Trees:</u>																			
Allepo pine	--	--	---	---	---	---	8	22	---	---	---	---	---	---	---	---	---	13	36
Arizona cypress	--	--	---	---	---	---	8	16	---	---	---	---	---	---	---	---	---	13	26
Athel	---	---	---	---	6	12	7	13	---	---	---	---	---	---	---	---	---	11	22
Bluegum eucalyptus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	38	77
Eldarica pine	---	---	---	---	---	---	8	16	---	---	---	---	---	---	---	---	---	13	26
Italian cypress	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	13	26
Redgum eucalyptus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	33	72
<u>Deciduous Trees:</u>																			
Arizona ash	---	---	---	---	---	---	9	19	---	---	---	---	---	---	---	---	---	15	31
Black locust	---	---	---	---	8	17	9	19	---	---	---	---	---	---	---	---	---	15	31
Honey locust	---	---	---	---	9	18	10	20	---	---	---	---	---	---	---	---	---	16	33
Italian poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	55	88
Lombardy poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	55	88
Russian mulberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	19	37
Russian-olive	---	---	---	---	7	15	8	17	---	---	---	---	---	---	---	---	---	13	28
Siberian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	13	28
Utah hybrid poplar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	55	88
<u>Shrubs:</u>																			
Bush-type rose	---	---	---	---	---	---	4	6	---	---	---	---	---	---	---	---	---	7	10
Desertwillow	---	---	---	---	---	---	4	6	---	---	---	---	---	---	---	---	---	7	10

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Euonymus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	7 10
European sage	---	---	---	---	---	4	5	---	---	---	---	---	---	---	---	---	---	6 8
Four-wing saltbush	3	5	3	5	3	6	4	6	---	---	---	---	---	---	---	---	---	6 10
Mesquite	---	---	---	---	---	4	8	---	---	---	---	---	---	---	---	---	---	7 13
Nanking cherry	---	---	---	---	---	5	7	---	---	---	---	---	---	---	---	---	---	8 12
Oleander	---	---	---	---	---	5	7	---	---	---	---	---	---	---	---	---	---	8 13
Quailbush	---	---	4	5	4	6	4	6	---	---	---	---	---	---	---	---	---	7 10
Siberian peashrub	---	---	---	---	4	8	5	8	---	---	---	---	---	---	---	---	---	8 14

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 4
 (Clayey, Favorable)

Description and Limitations: Soils in this group are deep to very deep, clayey and clayey-skeletal with an 8 to 20 inch loamy surface mantle, or loamy or loamy-skeletal with greater than 35% clay content; and are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils with surface layers having greater than 35% rock fragments.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	--	--	6	11	--	--	--	--	--	--	--	--	10	19
Arizona cypress	--	--	--	--	--	--	6	11	--	--	--	--	--	--	--	--	10	19
Athel	--	--	--	--	4	9	5	10	--	--	--	--	--	--	--	--	8	16
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	28	36
Eldarica pine	--	--	--	--	--	--	6	11	--	--	--	--	--	--	--	--	10	19
Italian cypress	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	19
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	52
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	--	--	7	13	--	--	--	--	--	--	--	--	11	22
Black locust	--	--	--	--	6	12	7	13	--	--	--	--	--	--	--	--	11	22
Honey locust	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	12	24
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	27
Russian-olive	--	--	--	--	6	11	6	12	--	--	--	--	--	--	--	--	10	20
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	20
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Shrubs:

Bush-type rose	--	--	--	--	--	--	3	4	--	--	--	--	--	--	--	--	5	7
Desertwillow	--	--	--	--	--	--	3	4	--	--	--	--	--	--	--	--	5	7
Euonymus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	7
European sage	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	6
Four-wing saltbush	2	3	2	4	2	4	2	4	--	--	--	--	--	--	--	--	4	7
Mesquite	--	--	--	--	--	--	3	6	--	--	--	--	--	--	--	--	5	10
Nanking cherry	--	--	--	--	--	--	4	5	--	--	--	--	--	--	--	--	6	9
Oleander	--	--	--	--	--	--	4	6	--	--	--	--	--	--	--	--	6	10
Quailbush	--	--	2	4	3	4	3	4	--	--	--	--	--	--	--	--	5	7
Siberian peashrub	--	--	--	--	3	6	4	6	--	--	--	--	--	--	--	--	6	10

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 4C
(Clayey)

Description and Limitations: Soils in this group have a fine earth fraction that is greater than 35% clay throughout. Soils with loamy surface layers less than 8 inches thick over clayey or clayey-skeletal layers are also included. They are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. High clay content affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils with surface layers having greater than 35% rock fragments. Because of high clay content, extra care will be needed to make sure soil around roots is firmly packed after planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
<u>Evergreen Trees:</u>																			
Allepo pine	--	--	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	9	18
Arizona cypress	--	--	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	9	18
Athel	--	--	--	--	4	8	5	9	--	--	--	--	--	--	--	--	--	8	15
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	26	52
Eldarica pine	--	--	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	9	18
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	49
<u>Deciduous Trees:</u>																			
Arizona ash	--	--	--	--	--	--	6	13	--	--	--	--	--	--	--	--	--	10	21
Black locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	--	10	21
Honey locust	--	--	--	--	6	12	7	13	--	--	--	--	--	--	--	--	--	11	22
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	26
Russian-olive	--	--	--	--	5	10	5	11	--	--	--	--	--	--	--	--	--	9	19
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	19

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Shrubs:																		
Bush-type rose	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	7
Desertwillow	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	7
Euonymus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	7
European sage	--	--	--	--	--	--	2	3	--	--	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	4	2	4	2	4	--	--	--	--	--	--	--	--	4	7
Mesquite	--	--	--	--	--	--	2	5	--	--	--	--	--	--	--	--	4	9
Nanking cherry	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	8
Oleander	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	9
Quailbush	--	--	2	4	2	4	2	4	--	--	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	3	6	--	--	--	--	--	--	--	--	5	10

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 5
(Dreughty)

Description and Limitations: Soils in this group are deep to very deep, and loamy and loamy-skeletal with moderate and moderately high available water capacities (AWC to 60" is 3.75 to 7.5"). They are somewhat poorly, moderately well or well drained. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	--	--	6	11	--	--	--	--	--	--	--	--	10	19
Arizona cypress	--	--	--	--	--	--	6	11	--	--	--	--	--	--	--	--	10	19
Athel	--	--	--	--	4	9	5	10	--	--	--	--	--	--	--	--	8	16
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	28	56
Eldarica pine	--	--	--	--	--	--	6	11	--	--	--	--	--	--	--	--	10	19
Italian cypress	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	19
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	52
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	--	--	7	13	--	--	--	--	--	--	--	--	11	22
Black locust	--	--	--	--	6	12	7	13	--	--	--	--	--	--	--	--	11	22
Honey locust	--	--	--	--	7	13	7	14	--	--	--	--	--	--	--	--	12	24
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	27
Russian-olive	--	--	--	--	6	11	6	12	--	--	--	--	--	--	--	--	10	20
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	20
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	64

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
Shrubs:																			
Bush-type rose	---	---	---	---	3	4	---	---	---	---	---	---	---	---	---	---	---	5	7
Desertwillow	---	---	---	---	3	4	---	---	---	---	---	---	---	---	---	---	---	5	7
Euonymus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5	7
European sage	---	---	---	---	2	4	---	---	---	---	---	---	---	---	---	---	---	4	6
Four-wing saltbush	2	3	2	4	2	4	2	4	---	---	---	---	---	---	---	---	---	4	7
Mesquite	---	---	---	---	3	6	---	---	---	---	---	---	---	---	---	---	---	5	10
Nanking cherry	---	---	---	---	4	5	---	---	---	---	---	---	---	---	---	---	---	6	9
Oleander	---	---	---	---	4	5	---	---	---	---	---	---	---	---	---	---	---	6	10
Quailbush	---	---	2	4	3	4	3	4	---	---	---	---	---	---	---	---	---	5	7
Siberian peashrub	---	---	---	---	3	6	4	6	---	---	---	---	---	---	---	---	---	6	10

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 5K
(Droughty, Carbonates)

Description and Limitations: Soils in this group are deep to very deep, loamy and loamy-skeletal with moderate and moderately high available water capacities (AWC to 60" is 3.75 to 7.5"). They are somewhat poorly, moderately well or well drained. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	--	9	18
Arizona cypress	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	--	9	18
Athel	--	--	--	--	4	8	5	9	--	--	--	--	--	--	--	--	8	15
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	26	52
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	49
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	6	13	--	--	--	--	--	--	--	--	--	--	10	21
Black locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	21
Honey locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	11	22
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	26
Russian-olive	--	--	--	--	5	6	5	6	--	--	--	--	--	--	--	--	9	10
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	2	4	--	--	--	--	--	--	--	--	--	--	4	7
Desertwillow	--	--	--	--	2	4	--	--	--	--	--	--	--	--	--	--	4	7

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Euonymus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	7
European sage	--	--	--	--	--	--	2	3	--	--	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	4	2	4	2	4	--	--	--	--	--	--	--	--	4	7
Mesquite	--	--	--	--	--	--	2	5	--	--	--	--	--	--	--	--	4	9
Oleander	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	9
Quailbush	--	--	2	4	2	4	2	4	--	--	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	3	6	--	--	--	--	--	--	--	--	5	10

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6
(Very Droughty)

Description and Limitations: Soils in this group are moderately deep to very deep; have loamy, loamy-skeletal, sandy, or sandy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 2.0 to 3.75" (can be less than 2.0" AWC if an irrigated phase of a soil). In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low AWC affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobby or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	--	--	5	10	--	--	--	--	--	--	--	--	8	17
Arizona cypress	--	--	--	--	--	--	5	10	--	--	--	--	--	--	--	--	8	17
Athel	--	--	--	--	4	8	4	8	--	--	--	--	--	--	--	--	7	14
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	49
Eldarica pine	--	--	--	--	--	--	5	10	--	--	--	--	--	--	--	--	8	17
Italian cypress	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	17
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	21	46
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	--	--	6	12	--	--	--	--	--	--	--	--	10	20
Black locust	--	--	--	--	6	11	6	12	--	--	--	--	--	--	--	--	10	20
Honey locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	21
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24
Russian-olive	--	--	--	--	4	10	5	11	--	--	--	--	--	--	--	--	8	18
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Shrubs:																		
Bush-type rose	--	--	--	--	--	--	3	4	--	--	--	--	--	--	--	--	4	6
Desertwillow	--	--	--	--	--	--	3	4	--	--	--	--	--	--	--	--	4	6
Euonymus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6
European sage	--	--	--	--	--	--	3	3	--	--	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	3	2	3	2	4	--	--	--	--	--	--	--	--	4	6
Mesquite	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	4	8
Nanking cherry	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	8
Oleander	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	8
Quailbush	--	--	2	3	2	3	2	4	--	--	--	--	--	--	--	--	4	6
Siberian peashrub	--	--	--	--	3	5	3	5	--	--	--	--	--	--	--	--	5	9

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6K
(Very Droughty, Carbonates)

Description and Limitations: Soils in this group are moderately deep to very deep; have loamy, loamy-skeletal, sandy, or sandy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 2.0 to 3.75" (can be less than 2.0" AWC if in an irrigated subgroup). In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. A low AWC and free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on most loamy-skeletal soils in this group.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
<u>Evergreen Trees:</u>																			
Allepo pine	--	--	--	--	--	--	5	10	--	--	--	--	--	--	--	--	--	8	16
Arizona cypress	--	--	--	--	--	--	5	10	--	--	--	--	--	--	--	--	--	8	16
Athel	--	--	--	--	3	7	4	8	--	--	--	--	--	--	--	--	--	6	13
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	23	46
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	42
<u>Deciduous Trees:</u>																			
Arizona ash	--	--	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	9	18
Black locust	--	--	--	--	5	10	5	11	--	--	--	--	--	--	--	--	--	9	18
Honey locust	--	--	--	--	6	11	6	12	--	--	--	--	--	--	--	--	--	10	20
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	52
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	52
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11	22
Russian-olive	--	--	--	--	4	9	5	10	--	--	--	--	--	--	--	--	--	8	16
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	52

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Shrubs:																		
Bush-type rose	---	---	---	---	2	4	---	---	---	---	---	---	---	---	---	---	4	6
Desertwillow	---	---	---	---	2	4	---	---	---	---	---	---	---	---	---	---	4	6
Euonymus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4	6
European sage	---	---	---	---	2	3	---	---	---	---	---	---	---	---	---	---	3	5
Four-wing saltbush	1	3	2	3	2	3	2	4	---	---	---	---	---	---	---	---	3	6
Mesquite	---	---	---	---	2	5	---	---	---	---	---	---	---	---	---	---	4	8
Oleander	---	---	---	---	3	5	---	---	---	---	---	---	---	---	---	---	5	8
Quailbush	---	---	2	3	2	3	2	4	---	---	---	---	---	---	---	---	4	6
Siberian peashrub	---	---	---	---	3	4	3	5	---	---	---	---	---	---	---	---	5	8

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 6R
(Moderately Deep, Favorable)

Description and Limitations: Soils in this group are moderately deep; have loamy, clayey-skeletal, or loamy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 3.75" or greater. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low to moderately high AWC affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume).

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	--	9	18
Arizona cypress	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	--	9	18
Athel	--	--	--	--	5	9	--	--	--	--	--	--	--	--	--	--	8	15
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	26	52
Eldarica pine	--	--	--	--	5	11	--	--	--	--	--	--	--	--	--	--	9	18
Italian cypress	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	18
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	49
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	6	13	--	--	--	--	--	--	--	--	--	--	10	21
Black locust	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	--	10	21
Honey locust	--	--	--	6	12	7	13	--	--	--	--	--	--	--	--	--	11	22
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60
Russian-olive	--	--	--	5	10	5	11	--	--	--	--	--	--	--	--	--	9	19
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	19
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	60

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Shrubs:

Bush-type rose	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	7
Desertwillow	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	7
Euonymus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	7
European sage	--	--	--	--	--	--	2	3	--	--	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	4	2	4	2	4	--	--	--	--	--	--	--	--	4	7
Mesquite	--	--	--	--	--	--	2	5	--	--	--	--	--	--	--	--	4	9
Nanking cherry	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	8
Oleander	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	9
Quailbush	--	--	2	4	2	4	2	4	--	--	--	--	--	--	--	--	4	7
Siberian peashrub	--	--	--	--	3	6	3	6	--	--	--	--	--	--	--	--	5	10

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP GRK
 (Moderately Deep, Carbonates)

Description and Limitations: Soils in this group are moderately deep; have loamy, clayey-skeletal, or loamy-skeletal textures; and have somewhat excessive or excessive drainage. Available water capacity (AWC) to 60" is 3.75" or greater. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. A low moderately high AWC and free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers, and severe on slopes greater than 30% gradient and on soils with stony, bouldery, cobbly or extremely gravelly surface layers. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume).

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	--	--	5	10	--	--	--	--	--	--	--	--	8	17
Arizona cypress	--	--	--	--	--	--	5	10	--	--	--	--	--	--	--	--	8	17
Athel	--	--	--	--	4	8	4	8	--	--	--	--	--	--	--	--	7	14
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	49
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	21	46
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	--	--	6	13	--	--	--	--	--	--	--	--	10	20
Black locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	20
Honey locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	21
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Russian-olive	--	--	--	--	4	10	5	11	--	--	--	--	--	--	--	--	8	18
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	6
Desertwillow	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	6
Euonymus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
European sage	--	--	--	--	--	2	3	--	--	--	--	--	--	--	--	4	5	
Four-wing saltbush	2	3	2	3	2	3	2	4	--	--	--	--	--	--	--	4	6	
Mesquite	--	--	--	--	--	2	5	--	--	--	--	--	--	--	--	4	8	
Oleander	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	8	
Quailbush	--	--	2	3	2	4	2	4	--	--	--	--	--	--	--	4	6	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 7
 (Sandy)

Description and Limitations: Soils in this group are deep to very deep and sandy throughout (includes arenic and gross arenic soil subgroups) and are moderately well, well somewhat excessive, or excessive drained. Available water capacity (AWC) to 60" is greater than 2.0. In the upper 12 inches they lack free carbonates, have a pH of up to 7.8, and are non-saline. A low to moderate available water capacity affects the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Soil blowing at or near the planting site can adversely affect the health and vigor of developing windbreaks. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	5	10	--	--	--	--	--	--	--	--	--	--	8	17
Arizona cypress	--	--	--	--	5	10	--	--	--	--	--	--	--	--	--	--	8	17
Athel	--	--	--	--	4	8	4	8	--	--	--	--	--	--	--	--	7	14
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	49
Eldarica pine	--	--	--	--	5	10	--	--	--	--	--	--	--	--	--	--	8	17
Italian cypress	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	17
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	21	46
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	6	13	--	--	--	--	--	--	--	--	--	--	10	20
Black locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	20
Honey locust	--	--	--	--	6	12	6	13	--	--	--	--	--	--	--	--	10	21
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	24
Russian-olive	--	--	--	--	4	10	5	11	--	--	--	--	--	--	--	--	8	18
Siberian crabapple	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	18
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	56

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	

Shrubs:

Bush-type rose	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	6
Desertwillow	--	--	--	--	--	--	2	4	--	--	--	--	--	--	--	--	4	6
Euonymus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	6
European sage	--	--	--	--	--	--	2	3	--	--	--	--	--	--	--	--	4	5
Four-wing saltbush	2	3	2	3	2	3	2	4	--	--	--	--	--	--	--	--	4	6
Mesquite	--	--	--	--	--	--	2	5	--	--	--	--	--	--	--	--	4	8
Nanking cherry	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	8
Oleander	--	--	--	--	--	--	3	5	--	--	--	--	--	--	--	--	5	8
Quailbush	--	--	2	3	2	3	2	4	--	--	--	--	--	--	--	--	4	6
Siberian peashrub	--	--	--	--	3	5	3	5	--	--	--	--	--	--	--	--	5	9

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:

A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 8
(Loamy, Carbonates)

Description and Limitations: Soils in this group are deep to very deep and loamy (< 35% clay content) and are moderately well or well drained; also included are clayey soils with a loamy surface mantle greater than 20 inches. Available water capacity (AWC) to 60" is greater than 7.5. In the upper 12 inches they have free carbonates, have a pH of 7.8 to 9.0, or have an electrical conductivity (EC) of up to 4 mmhos/cm. Free carbonates, high pH or a very slight EC in the upper 12" affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes, and severe on slopes greater than 30% gradient. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Allepo pine	--	--	--	--	7	14	--	--	--	--	--	--	--	--	--	--	12	24
Arizona cypress	--	--	--	--	7	14	--	--	--	--	--	--	--	--	--	--	12	24
Athel	--	--	--	--	6	11	6	12	--	--	--	--	--	--	--	--	10	20
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	70
Eldarica pine	--	--	--	--	7	14	--	--	--	--	--	--	--	--	--	--	12	24
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30	65
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	8	17	--	--	--	--	--	--	--	--	--	--	14	28
Black locust	--	--	--	--	8	15	8	17	--	--	--	--	--	--	--	--	14	28
Honey locust	--	--	--	--	8	16	9	18	--	--	--	--	--	--	--	--	15	30
Italian poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
Lombardy poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
Russian mulberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17	34
Russian-olive	--	--	--	--	7	14	7	15	--	--	--	--	--	--	--	--	12	25
Utah hybrid poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	80
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	4	5	--	--	--	--	--	--	--	--	--	--	6	9
Desertwillow	--	--	--	--	4	5	--	--	--	--	--	--	--	--	--	--	6	9

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
Euonymus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	6	9
European sage	---	---	---	---	---	---	3	4	---	---	---	---	---	---	---	---	---	5	7
Four-wing saltbush	2	4	2	4	3	5	3	5	---	---	---	---	---	---	---	---	---	5	9
Mesquite	---	---	---	---	---	---	4	7	---	---	---	---	---	---	---	---	---	6	12
Oleander	---	---	---	---	---	---	4	7	---	---	---	---	---	---	---	---	---	7	12
Quailbush	---	---	3	4	3	5	3	5	---	---	---	---	---	---	---	---	---	6	9
Siberian peashrub	---	---	---	---	4	7	4	8	---	---	---	---	---	---	---	---	---	7	13

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 96
(Wet, Saline, Alkaline)

Description and Limitations: Soils in this group are moderately deep to very deep with a water table at 18 to 60" from the surface; some are subject to flooding or ponding. They are poorly, somewhat poorly, or moderately well drained (including artificially drained). In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient, moderate on 15-30% slopes and on soils with very gravelly surface layers and severe on soils with stony, bouldery or cobbly surface layers; slopes above 30% gradient do not occur in this group. Hand planting has a moderate to severe limitation on soils having surface layers with greater than 15% rock fragments (by volume). Spring planting may be delayed for a short period because of soil wetness.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	21	42
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18	39
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	5	7	--	--	--	--	--	--	--	--	--	--	8	17
Russian-olive	--	--	--	--	4	8	4	9	--	--	--	--	--	--	--	--	7	15
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	3	3	--	--	--	--	--	--	--	--	--	--	4	5
European sage	--	--	--	--	2	2	--	--	--	--	--	--	--	--	--	--	3	4
Four-wing saltbush	1	2	2	2	2	3	2	3	--	--	--	--	--	--	--	--	3	5

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29", H = > 30", I = Irrigated during the growing season.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	Age:	10	20	Age:	10	20	Age:	10	20	Age:	10	20	Age:	10	20	

WINDBREAK SOIL GROUP SN
 (Dry, Saline, Alkaline)

Description and Limitations: Soils in this group are clayey, moderately deep to very deep, do not have a water table within 5 feet of the surface and are not subject to flooding or ponding. In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting. Because of high clay content, extra care will be needed to make sure soil around roots is firmly packed after planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
<u>Evergreen Trees:</u>																		
Arizona cypress	--	--	--	--	4	7	--	--	--	--	--	--	--	--	--	--	6	12
Bluegum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18	35
Redgum eucalyptus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	32
<u>Deciduous Trees:</u>																		
Arizona ash	--	--	--	--	7	8	--	--	--	--	--	--	--	--	--	--	7	14
Russian-olive	--	--	--	--	4	8	4	8	--	--	--	--	--	--	--	--	7	14
<u>Shrubs:</u>																		
Bush-type rose	--	--	--	--	2	3	--	--	--	--	--	--	--	--	--	--	3	5
European sage	--	--	--	--	2	3	--	--	--	--	--	--	--	--	--	--	3	4
Four-wing saltbush	1	2	2	2	2	3	2	3	--	--	--	--	--	--	--	--	3	5
Mesquite	--	--	--	--	2	4	--	--	--	--	--	--	--	--	--	--	3	7
Oleander	--	--	--	--	3	4	--	--	--	--	--	--	--	--	--	--	4	7

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Quailbush	--	--	2	2	2	3	2	3	--	--	--	--	--	--	--	3	5	
Siberian peashrub	--	--	--	--	2	4	2	4	--	--	--	--	--	--	--	4	7	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP SML
 (Dry, Saline, Alkaline, Favorable)

Description and Limitations: Soils in this group are loamy or loamy over clayey, moderately deep to very deep, do not have a water table within 5 feet of the surface and are not subject to flooding or ponding. In the upper 12 inches they have free carbonates, have a pH greater than 7.8, or have an electrical conductivity (EC) of 4 to 16 mmhos/cm. High pH or a slight to moderate EC in the upper 12" greatly affect the selection and growth of tree and shrub species. Competition from grass and weeds is the principal concern in the establishment and management of trees and shrubs. Limitations to machine planting are slight on slopes up to 15% gradient and moderate on 15-30% slopes; slopes above 30% gradient do not occur in this group. There are no limitations to hand planting.

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																		
	A		B		C		D		E		F		G		H		I		
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20		
<u>Evergreen Trees:</u>																			
Arizona cypress	---	---	---	---	4	8	---	---	---	---	---	---	---	---	---	---	---	7	13
Bluegum eucalyptus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	19	38
Redgum eucalyptus	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	16	36
<u>Deciduous Trees:</u>																			
Arizona ash	---	---	---	---	5	8	---	---	---	---	---	---	---	---	---	---	---	8	15
Russian-olive	---	---	---	3	7	4	7	---	---	---	---	---	---	---	---	---	---	6	12
<u>Shrubs:</u>																			
Bush-type rose	---	---	---	---	2	3	---	---	---	---	---	---	---	---	---	---	---	3	4
European sage	---	---	---	---	1	3	---	---	---	---	---	---	---	---	---	---	---	2	4
Four-wing saltbush	1	2	1	2	1	2	---	---	---	---	---	---	---	---	---	---	---	2	4
Mesquite	---	---	---	---	2	4	---	---	---	---	---	---	---	---	---	---	---	3	6
Oleander	---	---	---	---	3	4	---	---	---	---	---	---	---	---	---	---	---	4	6

ADAPTED SPECIES

COMMON NAME	Expected Average Height in Feet at Age 10 and 20 by Effective Moisture Subgroup ¹																	
	A		B		C		D		E		F		G		H		I	
	Age:	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
Quailbush	--	--	2	2	2	2	2	2	--	--	--	--	--	--	--	3	4	
Siberian peashrub	--	--	--	--	2	3	2	4	--	--	--	--	--	--	--	4	6	

¹ Effective Moisture Subgroups are based on average annual precipitation (AAP), aspect, and topographic position:
 A = < 7" AAP equivalency, B = 7-9", C = 10-12", D = 13-15", E = 16-19", F = 20-24", G = 25-29",
 H = > 30", I = Irrigated during the growing season.

WINDBREAK SOIL GROUP 10
(Unsuited)

Description and Limitations: Soils in this group have one or more characteristics such as soils depth, texture, drainage, available water capacity, or salts which severely limit planting, survival, or growth of trees and shrubs. Examples include very shallow and shallow soils, soils with a very low available water capacity (AWC is less than 2"), very poorly and poorly drained soils that are saturated or ponded throughout the growing season, and toxic salts. Soils in this group are not recommended for farmstead, feedlot or field windbreaks. However, onsite investigation may reveal that tree and shrub plantings can be made with special treatments such as irrigation and leaching of salts. the selection of species must then be tailored to the soil conditions existing at the altered site.